INSTRUCTION MANUAL

REGULATED POWER SUPPLIES

MODEL LM

C PACKAGE

THIS MANUAL APPLIES TO UNITS

BEARING SERIAL NO. PREFIXES A-D

LAMBDA

LAMBDA ELECTRONICS MELVILLE, L. I., N. Y.

INSTRUCTION MANUAL

FOR

REGULATED POWER SUPPLIES

MODEL LM

C PACKAGE

THIS MANUAL APPLIES TO UNITS

BEARING SERIAL NO. PREFIXES A-D

This manual provides instructions intended for the operation of Lambda power supplies, and is not to be reproduced without the written consent of Lambda Electronics.

LAMBDA ELECTRONICS MELVILLE, L.I., N.Y.

MAIN PLANT TELEPHONE: 516 Myrtle 4-4200

TABLE OF CONTENTS

SECTION	PAGE
SPECIFICATIONS AND FEATURES	1
Mounting	2
Accessories	2
Model Options	3
THEORY OF OPERATION	4
General	4
Functional Description	4
OPERATING INSTRUCTIONS	6
Basic Mode of Operation	6
Mounting	6
Connections for Operation	6
MAINTENANCE	8
General	8
Trouble Analysis	8
Checking Transistors and Capacitors	8
Printed Circuit Board Maintenance Techniques	8
Trouble Chart	9
Performance Check	10
Adjustment of Calibration Control R17	10
SERVICE	12
PARTS ORDERING	12
PARTS LIST	C-1

SPECIFICATIONS AND FEATURES

The following specifications apply for all Lambda C package LM power supplies. Specification exceptions noted here relate to models incorporating model option "Y" and/or "T". Performance specifications do not change for models with suffix "R", e.g., LM-C2-R unless the models also include model options "Y" and/or "T" e.g., LM-C2-YR; for these models the appropriate specification exceptions also apply.

NOTE: Specifications in italics apply only for Lambda models with a "Y" suffix, e.g., LM-C2-Y. AC INPUT specification with an asterisk*, applies only for Lambda models with a "V" or "T" suffix, e.g., LM-C2-YT.

DC OUTPUT--Voltage regulated for line and load

Voltage Range....For voltage range see table I of pertinent model group.

Multi-Current Ratings. . . .Current ratings specified for each maximum ambient temperature apply over entire output voltage range, with input frequency 55-65 cps. For input frequencies 45-55 at 105-132 VAC, 200-250 VAC, or 205-265 VAC, 40° current rating does not apply.

For input frequencies 360-440 cps, consult factory for current ratings.

For maximum current ratings at each ambient temperature see table I of pertinent model group.

REGULATED VOLTAGE OUTPUT

Regulation (line)...Less than 0.05 percent plus 4.0 millivolts for input variations from 105-132 or 132-105 volts AC
...Less than 0.01 percent plus 1.0 millivolt for input variations from 105-132 or 132-105 volts AC

Regulation (load)...Less than 0.03 percent plus 3.0 millivolts for load variations from 0 to full load or full load to 0
...Less than 0.02 percent plus 2.0 millivolts for load variations from 0 to full load or full load to 0

Remote Programming

External Resistor...Nominal 200 ohms/volt output

Programming Voltage...One-to-one voltage change

Ripple and Noise...One millivolt rms; 3 millivolts peak-to-peak
...0.5 millivolt rms; 1.5 millivolts peak-to-peak with 60 cps input

Temperature Coefficient...Change in output voltage less than 0.03%/°C
...Change in output voltage less than 0.01%/°C

AC INPUT--105-132 volts AC at 45-440 cps; 140 watts+
+ With output loaded to full 40°C rating and input voltage 132 volts at 55-65 cps.
*...200-250 volts AC at 45-440 cps ("T" option)
*...205-265 volts AC at 45-440 cps or 187-242 volts AC at 45-440 cps ("V" option)

When fusing of input power line is planned, use a 3.0 ampere type 3AG "SLO-BLO" fuse.

OVERLOAD PROTECTION

Thermal....Thermostat resets automatically when overtemperature condition is eliminated

Electrical...Within rated voltage range, an automatic electronic current-limiting circuit limits output current to approximately 110 percent of 40°C rated current for protection of load and power supply: for overloads approaching short circuit, both voltage and current decrease until at short circuit, current is reduced to a safe value, except for models LM-225, LMC-0-14, 0-32 and 0-60, where output current remains limited to 110 percent of 40° C ambient.

OVERSHOOT--No overshoot of output voltage under conditions of power turn-on, power turn-off, or power failure.

INPUT AND OUTPUT CONNECTIONS--Heavy duty terminal block on rear of chassis

OPERATING AMBIENT TEMPERATURE RANGE AND DUTY CYCLE--Continuous duty from -20°C to 71°C ambient with corresponding load current ratings for all modes of operation, and all mounting positions.

STORAGE TEMPERATURE-- -55°C to +85°C

CONTROLS

DC output control...Voltage adjust control permits adjustment of DC output voltage via access hole located in nameplate.

REMOTE SENSING--Provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation

PHYSICAL DATA

Size.....3-3/16" H x 4-15/16" W x 9-3/8" D

Weight.....9 lbs. net; 10 lbs. shipping wt.

Finish.....Grey, FED STD 595 No. 26081

MOUNTING--Three surfaces, each with tapped mounting holes, can be utilized for mounting this unit. All LMC power supplies can be mounted with Top,Front, or Right Side facing up. Top, Front, or Right Side must be in a horizontal plane. Refer to figure 9 for mounting details.

ACCESSORIES

Rack Adapters . . . Rack adapters LRA-4, LRA-6, LRA-7, LRA-8, LRA-10, LRA-11, LRA-12, and LRA-13, used for ruggedized mounting, with or without chassis slides, are available, as well as rack adapters LRA-3 and LRA-5 which are used for simple rack installations where chassis slides are not required.

Metered and Non-Metered Panels...Metered panels MP-3, MP-5 and Non-Metered panels P-3, P-5 are available for use with the Lambda rack adapters LRA-3, LRA-4, LRA-5, LRA-6 or LRA-7.

Blank Panels...Full-rack, half-rack and quarter-rack panels can be used with the Lambda rack adapters. The following chart lists the panels and rack adapters that can be utilized together.

Rack Adapter	BLANK PANELS			Metered/Non Metered Panel
	1/2 Rack	1/4 Rack	Full Rack	
LRA 3	LBP-20	LBP 10	LBP-40	MP-5, P-5
LRA 6	LBP-20	LBP-10	LBP-40	MP-5, P-5
LRA 4	LBP-50	LBP-60	LBP-30	MP-3, P-3
LRA 5	LBP-50	LBP-60	LBP-30	MP-3, P-3

Overvoltage Protector...Externally mounted, Overvoltage Protectors LMOV-1, LMOV-2 and LMOV-3 are available for use with Lambda LM power supplies.

MODEL OPTIONS

Suffix "T" Input Option...Standard LM power supplies are available for operation with 200-250 volt, 45-440 cps input.

Suffix "Y" High Performance Option...All Lambda LM power supplies are available with high performance specifications. See italicized entries under SPECIFICATIONS AND FEATURES.

Suffix "R" Fungus Proofing Option...Standard LM power supplies can be obtained with fungus proofing treatment with MIL V 173 varnish for all fungi nutrient components.

Suffix "V" Input Option...Standard LM power supplies are available for operation with 205-265 volt, 45-440 cps input or 187-242 volt, 45-440 cps input. See nameplate for AC input rating. See schematic diagram for rewiring of AC input.

Suffix "S" Option...Standard LMC power supplies may be used with a Systems Power Sequencer or Systems Power Protector. On units with "S" option resistor R2 is jumped; see schematic diagram.

THEORY OF OPERATION

GENERAL

The Lambda power supply consists of an AC input circuit and transformer; a bias supply consisting of an auxiliary rectifier, filter, and a zener diode regulator; and a main regulator circuit consisting of the main rectifier and filter, a series regulator, emitter follower drivers, an error amplifier, a current limit amplifier, an output voltage sensing circuit and an output current sensing circuit. In addition, certain models also contain a current sink circuit or a voltage amplifier circuit.

The circuit arrangement is shown in block diagram form in figure 7. The circuitry is discussed with reference to the block diagram and the schematic diagram.

FUNCTIONAL DESCRIPTION

Single phase input power is applied to transformer T1 through the input circuit containing thermostat S1, which protects the supply against overheating.

The main rectifier, a full-wave rectifier, provides the power which is filtered by capacitor C8 and then regulated via a series regulator and delivered to the output. Bias supply, half-wave, auxiliary rectifier CR7, provides voltage filtered by capacitor C7 and regulated by zener diode CR6 for current limit amplifier Q3 and error amplifier Q1, Q2 (or, as applicable, for voltage amplifier Q2). Zener diode CR1 and resistor R5, across the bias supply, provide a regulated temperature compensated reference voltage. Resistor R4 compensates for input voltage variations.

Operation of the voltage regulator circuit is determined by changes in the output voltage. A change in the output voltage is sensed by the sensing divider resistors which compare output voltage with the +S reference voltage. This provides an error voltage at junction of R2 and R3 (or, as applicable, R1 and R3) which is amplified by error amplifier Q1, and Q2 (and as applicable, by voltage amplifier Q2), and is current amplified by drivers Q5, Q6 (or as applicable by Q5, Q8). The amplified signal from the drivers controls the voltage across series regulator Q8, Q9, (or as applicable by Q9, Q10) which functions as the active regulating element, restoring output voltage to the proper level.

*Current limit circuit operation is determined by changes in the load. Current limit amplifier Q3 samples load current through current sensing resistor R28. When the voltage drop across R28 increases compared with the preset voltage reference determined by R17 and R18, (and CR4 and Q4 where applicable), Q3 conducts. Thus, when the output current rating of the unit is exceeded, current limit amplifier Q3 conducts decreasing the current through drivers Q5, Q6, resulting in an increase of voltage across the series regulator and a decrease of the output voltage, effectively limiting the output current to a safe value. The current limit value is determined by the factory setting of current limit potentiometer R17.

+When operating conditions approach short circuit, the output voltage decreases. Since the voltage determined by R17 and R18 is proportional to the output voltage, when the output voltage decreases, Q3 is biased into turn-on at lower and lower load currents until output voltage decreases to zero and current decreases to a predetermined low value.

+The following theory only applies for units with current sink Q4.

When operating conditions approach short circuit, and output voltage value decreases below the minimum voltage rating, current sink Q4 saturates and the divider R17, R18, Q4, R19 becomes purely resistive with no regulated reference for current limit operation. With Q4 in saturation the voltage reference becomes proportional to the output voltage, i.e., decreases as the output voltage decreases. This permits Q3 to turn on at lower and lower load currents until output voltage decreases to zero and current decreases to a predetermined low value.

*The following theory only applies for units with voltage amplifier Q2.

Current limit circuit operation is determined by changes in the load. When load current increases above the rated current value, the voltage drop across current limit potentiometer R17 increases, turning on current limit amplifier Q3. With Q3 conducting, the current to driver Q5 decreases, limiting the base current to series regulator Q8, Q9, which results in an increase of voltage across the series regulator and a decrease of the output voltage, effectively limiting the output current to a safe value. The current limit value is determined by the factory setting of current limit potentiometer R17.

When operating conditions reach short circuit, the output voltage value decreases to zero and the current decreases to a predetermined current limit value and remains unchanged.

OPERATING INSTRUCTIONS

BASIC MODE OF OPERATION

This power supply operates as a constant voltage source provided the load current does not exceed the rated value at 40°C. For continuous operation, load current must not exceed the rating for each ambient temperature. *When load current exceeds 110% of 40°C rating, both voltage and current decrease until voltage reaches zero and the current at short circuit equals approximately 30 percent or less of the rated current.

*For models LM 225, LMC-0-14, LMC-0-32, LMC-0-60 output current remains limited to 110% of 40°C current rating.

MOUNTING

When using this unit as a mounted component, a cutout must be provided to permit free-flow of air through the unit. See figure 9 for cutout sizes and specific mounting details.

CONNECTIONS FOR OPERATION

NOTE: Make all connections to the unit before applying AC input power.

Ground Connections. The Lambda power supply can be operated either with negative or positive output terminal grounded. Both positive and negative ground connections are shown in the diagrams for all suggested output connections illustrated in this manual.

Connection Terminals. Make all connections to the supply at the terminal block on the rear of the supply. Apply input power to terminals 1 and 2; always connect the ungrounded (hot) lead to terminal 1.

The supply positive terminal is brought out to terminal 6; the negative terminal to terminal 4.

NOTE: When shipped from the factory, the supply is ready for use as a local-sensing constant voltage source. Jumpers are connected at the factory as shown in figure 3. Take care to remove the appropriate jumpers for load requirements that need different supply-load connections. Refer to the appropriate connection diagram.

Supply-Load Connections. The regulation of the supply at the load may change when connecting leads of practical length are used. To minimize the effect of the output load leads, remote sensing is used. Refer to figure 1 to determine voltage drop for particular cable lengths, wire size and current conditions. Lead lengths must be measured from supply terminals to load terminals as shown in fugure 2.

Local-Sensing Connection, See Figure 3.

Remote -Sensing Connection, See Figure 4.

Programmed Voltage Connection Using External Resistor, See Figure 5. Discrete voltage steps can be programmed with a resistance voltage divider valued at nominal 200 ohms/volt output and a shorting-type switch. For continuous voltage variations, use a variable resistor with the same ohms/volt ratio in place of the voltage divider and shorting-type switch. Use low temperature coefficient resistor(s) to assure most stable operation.

Programmed Voltage Connection Using Programming Voltage, See Figure 6. The power supply voltage output can be programmed with an externally connected programming power supply. The output voltage of the programmed supply will maintain a one-to-one ratio with the voltage of the programming supply.

The programming supply must have a reverse current capability of 6 ma. minimum.

Alternatively, when supplies with less than 6 ma. reverse current capability are used, a resistor capable of drawing 6 ma. at the minimum programming voltage must be connected across the output terminals of the supply. This programming supply must be rated to handle all excess resistor current at the maximum programming voltage.

Operation After Thermostat Shutdown. The thermostat opens the input circuit only when the power supply output current exceeds the current rating specified for the operating ambient temperature, causing the unit to overheat. Do not exceed current rating specified for the operating ambient temperature. When the temperature of the unit decreases to a safe operating value, the thermostat will reset automatically.

Operation After Fuse Shutdown. Internal component failure is prevented by fuses which protect the components from damage caused by excessive currents. Fuses will blow when the maximum rated current value for the fuse is exceeded. Fatigue failure of fuses can occur when mechanical vibrations from the installation combine with thermally induced stresses to weaken the fuse metal. Many fuse failures are caused by a temporary condition and replacing the blown fuse will make the fuse protected circuit operative.

MAINTENANCE

GENERAL

This section describes trouble analysis routine, calibration and test procedures that are useful for servicing the Lambda power supply. A trouble chart is provided as an aid for the troubleshooter. Refer to the section on specifications and features for the minimum performance standards.

TROUBLE ANALYSIS

Whenever trouble occurs, systematically check all fuses, primary power lines, external circuit elements, and external wiring for malfunction before trouble shooting the equipment. Failures and malfunctions often can be traced to simple causes such as improper jumpers and supply-load connections or fuse failure due to metal fatigue.

Use the electrical schematic diagram and block diagram, figure 7, as an aid to locating trouble causes. The schematic diagram contains various circuit voltages that are averages for normal no load operation. Measure these voltages using the conditions for measurement specified on the schematic diagram. Use measuring probes carefully to avoid causing short circuits and damaging circuit components.

CHECKING TRANSISTORS AND CAPACITORS

Check transistors with an in-circuit transistor checker. If no checker is available, transistors can be checked with an ohmmeter that has a highly limited current capability. Observe proper polarity for PNP or NPN to avoid error in measurement. The forward transistor resistance is low but never ZERO; backward resistance is always higher than the forward resistance.

Do not assume trouble is eliminated when only one part is replaced. This is especially true when one transistor fails, causing other transistors to fail. Replacing only one transistor and turning power on, before checking for additional faulty components could damage the replaced component.

When soldering semi-conductor devices, hold the lead being soldered with a pair of pliers or a commercial heat sink device placed between the component and the solder joint.

> NOTE: The leakage resistance obtained from a simple resistance check of a capacitor is not always an indication of a faulty capacitor. In all cases the capacitors are shunted with resistances, some of which have low values. Only a dead short is a true indication of a shorted capacitor.

PRINTED CIRCUIT BOARD MAINTENANCE TECHNIQUES

1. If foil is intact but not covered with solder it is a good contact. Do not attempt to cover with solder.
2. Voltage measurements can be made from either side of the board. Use a needle-point probe to penetrate to the wiring whenever a protective coating is used on the wiring. A brass probe can be soldered to an alligator clip adapted to measuring instrument.
3. Always use a heat sink when soldering transistors; a transistor pad with mounting feet is an effective heat sink.
4. Broken or damaged printed wiring is usually the result of an imperfection, strain or careless soldering. To repair small breaks, tin a short piece of hook-up wire to bridge

the break, and holding the wire in place, flow solder along the length of wire so that it becomes part of the circuitry.

5. When unsoldering components from the board never pry or force loose the part; unsolder the component by using the wicking process described below:

(a) Select a 3/16 inch tinned copper braid for use as a wick; if braid is not available, select AWG No. 14 or No. 16 stranded wire with 1/2 inch insulation removed.

(b) Dip the wick in liquid rosin flux.

(c) Place the wick onto the soldered connection and apply soldering iron onto the wick.

(d) When sufficient amount of solder flows onto the wick, freeing the component, simultaneously remove iron and wick.

TROUBLE CHART

The trouble chart is intended as a guide for locating trouble causes, and is used along with the schematic diagram.

The operating conditions assumed for the trouble chart are as follows:

(a) AC power of proper voltage and frequency is present at input terminals.

(b) Either positive or negative terminal is connected to chassis ground.

(c) The power supply is connected for constant voltage with local sensing. See schematic; dotted lines indicate jumpers connected for local sensing operation.

TROUBLE CHART

Symptom	Probable Cause	Remedy
1. No output voltage	No power input, thermostat S1 open	Check power source, S1, line cord and line cord plug; shut off unit, allow to cool and check ambient temperature
	Improper output terminal connection	Refer to appropriate connection diagram, and check for correct connections
	Faulty Q2, CR1, CR6 (or Q3 for Zero Volt units)	Check Q2, CR1, CR6 (or Q3) for short and replace as required
2. Unable to adjust output voltage	Damage VOLTAGE ADJUST control	Check R1 for shorts and/or open; replace as required
	Supply operating as constant current source at current limit value	Remove load, check load value and check for shorts and/or improper supply-load connections; refer to appropriate diagram for correct connections
3. Output voltage too high	Improper output terminal connection	Refer to appropriate connection diagram, and check for correct connections

TROUBLE CHART (Cont'd)

Symptom	Probable Cause	Remedy
3. (Cont'd)	Faulty Q1, R1, Q8, Q9, (and Q10 as req'd) Q5, Q6, or CR1	Check R1 for open; Q8, Q9, (Q10) Q5, Q6, Q1 for short; CR1 for open and replace - as required.
4. Output voltage	Load resistance improper for unit ratings	Check load resistance value
	Faulty Q2, Q3, R28, R17 (or CR4 where used)	Check Q2, Q3, (or CR4) for short, R28, R17 for open, replace as required.
5. High ripple and unregulated DC output	Load resistance improper for unit ratings	Check load resistance value
6. This step only for units with current sink Q4. Current limit value improper and varies directly with output voltage	Faulty Q4	Check Q4 for short and replace as required.
7. High ripple	Improper ground	Connect terminal 6 or terminal 4 to ground terminal 5

PERFORMANCE CHECK

Check the ripple and regulation of the power supply using the test connection diagram shown in figure 8. Use suggested test equipment or equivalent to obtain accurate results. Refer to SPECIFICATIONS AND FEATURES for minimum performance standards.

Set the differential meter, DC VTVM (John Fluke Model 825A or equivalent) to the selected power supply operating voltage. Check the power supply load regulation accuracy while switching from the full load to no-load condition. Long load leads should be a twisted pair to minimize AC pick-up.

Use a Variac to vary the line voltage from 105-132 or 132-105 volts AC and check the power supply line regulation accuracy on the VTVM differential meter.

Use a VTVM, Ballantine 320 or equivalent, to measure rms ripple voltage of the power supply DC output. Use oscilloscope to measure peak-to-peak ripple voltage of the power supply DC output.

ADJUSTMENT OF CALIBRATION CONTROL R17

Whenever Q3, R28* or R17* (and Q4, CR4 where used) are replaced, and voltage and current indications do not reflect maximum ratings, adjust R17 as follows:

*For models LM225, LMC-0-14, LMC-0-32, LMC-0-60, adjustment is required only when R17 or R28 is replaced. The adjustment procedure requires that the power supply is removed from associated equipment, is at an ambient temperature of 25-30°C, and is stabilized and not operating.

1. Remove AC power input to the supply.

2. Unsolder wiper of R17 from resistor housing and turn to full CW position.

3. Operate power supply for constant voltage with local sensing, connected as shown in figure 3, with no external load.

4. ** Turn voltage adjust control until minimum rated output voltage is obtained.

5. ** Apply load so that output current is 110% of 40°C rating for the unit.

6. ** Using an oscilloscope, Tektronix 503 or equivalent, observe output voltage while adjusting R17 in a CCW direction. Adjust R17 until output ripple increases sharply and oscilloscope pattern changes.

7. ** After adjustment is completed, remove AC power input to the supply and solder wiper of R17 to resistor housing.

8. ** After soldering, check setting and repeat adjustment procedure if required.

** Perform alternate steps 4A through 9A for adjustment of R17 on models LM225, LMC-0-14, LMC-0-32 and LMC-0-60.

4A. Turn voltage adjust control until rated output voltage is obtained.

5A. Apply load so that output current is 130% of 40°C rating for the unit.

6A. Using an oscilloscope, Tektronix 503 or equivalent, observe unit output voltage while adjusting R17 in a CCW direction. Adjust R17 until output ripple increases sharply and oscilloscope pattern changes.

7A. Place a DC ammeter of appropriate scale across output terminals 4 and 6 of the supply. The meter indication shall be a maximum of 133% of 40°C rating for the unit.

8A. After adjustment is completed, remove AC power input to the supply and solder wiper of R17 to resistor housing.

9A. After soldering, check setting and repeat adjustment procedure if required.

SERVICE

When additional instructions are required or repair service is desired, contact the nearest Lambda office where trained personnel and complete facilities are ready to assist you.

Please include the power supply model and serial number together with complete details of the problem. On receipt of this information, Lambda will supply service data or advise shipping for factory repair service.

All repairs not covered by the warranty will be billed at cost and an estimate forwarded for approval before work is started.

PARTS ORDERING

Standard components and special components used in Lambda power supply can be obtained from the factory. In case of emergency, critical spare parts are available through any Lambda office.

The following information must be included when ordering parts:

1. Model and number and serial number of power supply and purchase date.
2. Lambda part number.
3. Description of part together with circuit designation.
4. If part is not an electronic part, or is not listed, provide a description, function, and location of the part.

PARTS LIST

The electrical parts located on all LM-C models are listed here. Parts common to a group of LM-C models are listed first. Unique parts of individual models within the group are listed separately, by model, immediately following the group common-parts listing. In addition there are separate listings of parts for the metered panel (MP) option, the Y option and the overvoltage protection (OV) option, as applicable, for all LM-C models. The parts listed for model LMC-0-60, do not utilize the common parts - unique parts listings: all the parts for this model are sequentially listed under the heading 'PARTS FOR MODEL LMC-0-60". Parts for the "V" option, "T" option and "R" option are included at the end of the listing.

MODELS LM-226 — LM-229

COMMON PARTS

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
C1	Cap. mylar, 0.033 mfd ±10%, 400 vdc	CGL33-006
C2	Cap. mylar, 0.22 mfd ±10%, 100 vdc	CGM22-003
C4	Cap., elect., 3.0 mfd -10% + 75%, 100 vdc	CBN30-015
C5	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL10-002
C7*	Cap., elect., 140 mfd -10% + 100%, 38 vdc	CBR14-030
C9	Cap., mylar, 0.022 mfd ±10%, 200 vdc	CGL22-001
C11	Not assigned	
C12+	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK10-004
CR1*	Rectifier, zener diode	FBM-Z104
CR2	Rectifier	FBL-00-030
CR3	Same as CR2	
CR4	Rectifier, zener diode	FBM-Z102
CR5	Same as CR2	
CR6	Rectifier, zener diode	FBM-Z103
CR7	Same as CR2	
Q1	Transistor, NPN	FBN-L110
Q2	Same as Q1,	
Q3	Same as Q1	
Q7	Not assigned	
R3	Res., WW, 1200 ohms ±3%, 2W	DFS12-030
R4*	Res., film, 15,000 ohms ±2%, 1/2 W	DCT15-013
R5	Res., film, 220 ohms ±2%, 1/2 W	DCR22-005
R6	Res., comp., 180,000 ohms ±10%, 1/2 W	DEB 1841
R7	Res., film, 3900 ohms ±5%, 1/2W	DCS 39-014
R8	Res., comp., 4700 ohms ±10%, 1/4 W	DCB4721
R9	Res., comp., 150 ohms ±10%, 1/4 W	DCB1511
R10	Res., comp., 3900 ohms ±10%, 1/2W	DEB 3921
R11	Res., comp., 22,000 ohms ±10%, 1/2W	DEB2231
R12	Res., comp., 47 ohms ±10%, 1/2W	DEB4701

MODELS LM-226 — LM-229 (Cont)

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
R13*	Res., WW, 600 ohms ±3%, 3W	DFR60-005
R14, R15	Not assigned	
R17	Res., var., WW, 1200 ohms ±10%, 1-1/2W	DNS12-026
R18	Res., film, 2000 ohms ±5%, 1/2W	DCS20-018
R22	Res., comp., 1200 ohms ±10%, 1/2W	DEB1221
R23	Res., Comp., 68 ohms ±10%, 1/2W	DEB6801
R24, R25	Not assigned	
R27	Not assigned	

*This part not used on units with "Y" option
+This part not used on units with serial no. prefixes A, B.

UNIQUE PARTS

MODEL LM-226

C3	Cap., elect., 1000 mfd -10% +100%, 28 vdc	CBS10-025
C6	Cap., mylar, 0.0033 mfd ±10%, 200 vdc	CGK33-003
C8	Cap., elect., 4800 mfd -10% + 100%, 30 vdc	CBS42-032
C10	Cap., mylar, 0.022 mfd ±10%, 200 vdc	CGL22-001
CR8	Rectifier	FBL-00-054
CR9	Not assigned	
CR10	Same as CR8	
CR11	Not assigned	
Q4	Transistor, NPN	FBN-L103
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN-36486
Q8	Transistor, NPN	FBN-36485
Q9	Same as Q8	
R1	Res., var., 2200 ohms ±5%, 5W	DNS22-056

UNIQUE PARTS (Cont)

MODEL LM-226 (Cont)

CIRC. DES.	DESCRIPTION	LAMBDA NO.
R2	Res., WW, 1200 ohms ±3%, 2W	DFS12-030
R16	Res., comp., 1800 ohms ±10%, 1/2W	DEB1821
R19	Res., film, 1000 ohms ±5%, 1/2W	DCS 10-019
R20	Res., comp., 15,000 ohms ±10%, 1/2W	DEB1531
R21	Res., film, 1800 ohms ±5%, 1/2W	DCS18-013
R26	Res., WW, 1.0 ohm ±3%, 5W	DFN10-014
R28	Same as R26	
T1	Transformer	ABA-226

MODEL LM-227

C3	Cap., elect., 250 mfd -10% + 100%, 100 vdc	CBR25-024
C6	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL10-002
C8	Cap., elect., 1950 mfd, -10% +100%, 60 vdc	CBS20-033
C10	Cap., mylar, 0.022 mfd ±10%, 200 vdc	CGL22-001
CR8	Rectifier	FBL-00-054
CR9	Not assigned	
CR10	Same as CR8	
CR11	Not assigned	
Q4	Transistor, NPN	FBN-L103
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN-35469
Q8	Transistor, NPN	FBN-36220
Q9	Same as Q8	
R1	Res. var., WW, 4500 ohms ±5%, 5W	DNS45-050
R2	Res., WW, 2000 ohms ±3%, 3W	DFS20-032
R16	Res., comp., 4700 ohms ±10%, 1/2W	DEB4721
R19	Res., film, 2700 ohms ±5%, 1/2W	DCS27-020
R20	Res., comp., 47,000 ohms ±10%, 1/2W	DEB4731
R21	Res., film, 2400 ohms ±5%, 1/2W	DCS24-001
R26	Res., WW, 1.0 ohm ±3%, 3W	DFN10-041
R28	Same as R26	
T1	Transformer	ABA-227

MODEL LM-228

C3	Cap., elect., 250 mfd -10% + 100%, 100 vdc	CBR25-024
C6	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL10-002
C8	Cap., elect., 1950 mfd -10% + 100%, 60 vdc	CBS20-033
C10	Not assigned	
CR8 Thru CR11	Rectifier	FBL-00-054
Q4	Transistor, NPN	FBN-L103
Q5	Transistor, NPN	FBN-L108
Q6	Transistor, NPN	FBN-36488
Q8	Transistor, NPN	FBN-36487
Q9	Same as Q8	
R1	Res., var., WW, 4500 vdc ±5%, 5 W	DNS45-050

UNIQUE PARTS (Cont)

MODEL LM-228 (Cont)

CIRC. DES.	DESCRIPTION	LAMBDA NO.
R2	Res., WW, 3000 ohms ±3%, 3 W	DFS30-021
R16	Res., comp., 4700 ohms ±10%, 1/2 W	DEB4721
R19	Res., film, 6800 ohms ±5%, 1/2 W	DCS-68-021
R20	Res., comp., 120,000 ohms ±10%, 1/2 W	DEB1241
R21	Res., film, 4700 ohms ±5%, 1/2 W	DCS47-003
R26	Res., WW, 1.5 ohm ±3%, 3 W	DFN15-042
R28	Same as R26	
T1	Transformer	ABA-228

MODEL LM-229

C3	Cap., elect., 250 mfd -10% + 100%, 100 vdc	CBR25-024
C6	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK10-004
C8	Cap., elect., 850 mfd -10% + 100%, 60 vdc	CBR85-036
C10	Not assigned	
CR8 Thru CR11	Rectifier	FBL-00-054
Q4	Transistor, NPN	FBN-L107
Q5	Transistor, NPN	FBN-L108
Q6	Transistor, NPN	FBN-35903
Q8	Transistor, NPN	FBN-35902
Q9	Same as Q8	
R1	Res., var., WW, 9000 ohms ±5%, 5 W	DNS90-058
R2	Res., WW, 4500 ohms ±3%, 3 W	DFS45-044
R16	Res., comp., 6820 ohms ±10%, 1/2 W	DEB6821
R19	Res., film, 10,000 ohms ±5%, 1/2 W	DCT10-008
R20	Res., comp., 180,000 ±10%, 1/2 W	DEB1841
R21	Same as R19	
R26	Res., WW, 3.0 ohms ±3%, 3 W	DFN30-023
R28	Same as R26	
T1	Transformer	ABA-229

MODELS LM-C3 — LM-C6

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ± 10%, 400 vdc	CGL-33-006
C2	Cap., mylar, 0.22 mfd ± 10%, 100 vdc	CGM-22-003
C3	Cap., elect., 1700 mfd, -10% +100%, 20 vdc	CBS-17-035
C4	Cap., elect., 3.0 mfd -10 + 75%, 100 vdc	CBN-30-015
C5	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002
C6	Cap., mylar, 0.018 mfd ±10%, 200 vdc	CGL-18-005
C7*	Cap., elect., 140 mfd -10% + 100%, 38 vdc	CBR-14-030
C8	Cap., elect., 4,900 mfd -10 + 100%, 20 vdc	CBS-49-041
C9	Cap., mylar, 0.022 mfd ± 10%, 200 vdc	CGL-22-001
C10	Same as C9	
C11	Not used	

MODELS LM-C3 — LM-C6 (Cont)

COMMON PARTS (Cont)

CIRC. DES.	DESCRIPTION	LAMBDA NO.
C12	Cap., mylar, 0.001 mfd ± 10%, 200 vdc	CGK-10-004
CR1*	Rectifier, zener diode	FBM-Z104
CR2	Rectifier	FBL-00-030
CR3	Same as CR2	
CR4	Not used	
CR5	Not used	
CR6	Rectifier, zener diode	FBM-Z103
CR7	Same as CR2	
CR8	Rectifer,	FBL-00-054
CR9	Not used	
CR10	Same as CR8	
Q1	Transistor, NPN	FBN-L110
Q2	Same as Q1	
Q3	Same as Q1	
Q4	Not used	
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN-36486
Q7	Not used	
Q8	Transistor, NPN	FBN-36485
Q9	Same as Q8	
R3	Res., ww, 1,200 ohms ± 3%, 2w	DFS-12-030
R4*	Res., film, 15,000 ohms, ± 2%, 1/2W	DCT-15-013
R5	Res., film, 220 ohms, ± 2%, 1/2w	DCR-22-005
R6	Res., comp., 180,000 ohms ± 10%, 1/2w	DEB-1841
R7	Res., film, 3,900 ohms ±5%, 1/2w	DCS-39-014
R8	Res., comp., 4,700 ohms ± 10%, 1/4w	DCB4721
R9	Res., comp., 150 ohms ± 10%, 1/4w	DCB-1511
R10	Res., comp., 2,200 ohms ± 10%, 1/2w	DEB-2221
R11	Res., comp., 22,000 ohms ± 10% 1/2w	DEB-2231
R12	Res., comp., 47 ohms ± 10%, 1/2w	DEB-4701
R13*	Res., ww, 600 ohms ± 3%, 3w	DFR-60-005
R14	Not used	
R15	Not used	
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB-8211
R17	Res., var., ww, 1,200 ohms ± 10%, 1-1/2w	DNS-12-026
R19-R21	Not used	
R22	Res., comp., 1200 ohms ± 10%, 1/2w	DEB-1221
R23	Res., comp., 68 ohms ± 10%, 1/2w	DEB-6801
R24	Not used	
R25	Not used	
R26	Res., ww, 0.39 ohms ± 5%, 5w	DFM-39-046
R27	Not used	
R28	Same as R26	

*This part not used on units with "Y" option.

UNIQUE PARTS

MODEL LM-C3

R1	Res., var., ww, 300 ohms, ± 5%, 5w	DNR30-016
R2	Res., ww, 430 ohms, ± 3%, 3w	DFR43-058

UNIQUE PARTS (Cont)

MODEL LM-C3 (Cont)

R18	Not used	
T1	Transformer	ABA-C3

MODEL LM-C3P3

R1	Res., var., ww, 600 ohms, ± 5%, 5w	DNR60-028
R2	Res., ww, 430 ohms, ±3%, 3w	DFR43-058
R18	Not used	
T1	Transformer	ABA-C4

MODEL LM-C3P6

R1	Res., var., ww 600 ohms, ± 5%, 5w	DNR60-028
R2	Res., ww, 430 ohms, ± 3% 3w	DFR43-058
R18	Not used	
T1	Transformer	ABA-C4

MODEL LM-C4

R1	Res., var., ww, 600 ohms, ± 5%, 5w	DNR60-028
R2	Res., ww, 600 ohms, ± 3%, 3w	DFR60-005
R18	Not used	
T1	Transformer	ABA-C4

MODEL LM-C4P5

R1	Res., var., ww, 600 ohms ± 5%, 5w	DNR60-028
R2	Res., ww, 650 ohms ± 3%, 3w	DFR65-062
R18	Res., film, 390 ohms ±5%, 1/2w	DCR39-004
T1	Transformer	ABA-C5

MODEL LM-C5

R1	Res., var., ww, 600 ohms ± 5%, 5w	DNR60-028
R2	Res., ww, 650 ohms, ± 3%, 3w	DFR-65-062
R18	Res., film, 1,300 ohms ± 5%, 1/2w	DCS13-010
T1	Transformer	ABA-C5

MODEL LM-C6

R1	Res., var., ww, 600 ohms ± 5%, 5w	DNR60-028
R2	Res., ww, 800 ohms, ± 3%, 2w	DFR80-037
R18	Res., film, 1,300 ohms ± 5%, 1/2w	DCS13-010
T1	Transformer	ABA-C6

MODELS LM-C8 — LM-C60

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ±10% 400 vdc	CGL-33-006
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM-22-003
C4	Cap., elect., 3.0 mfd -10% + 75% 100 vdc	CBN-30-015
C5	Cap., mylar, 0.01 mfd ± 10%, 200 vdc	CGL-10-002
C7*	Cap., elect., 140 mfd -10% + 100%, 38 vdc	CBR-14-030

MODELS LM-C8 – LM-C60 (Cont)

COMMON PARTS (Cont)

CIRC. DES.	DESCRIPTION	LAMBDA NO.
C9	Cap., mylar, 0.022 mfd ±10%, 200 vdc	CGL-22-001
C10	Not used	
C11	Not used	
C12	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK-10-004
CR1*	Rectifier, zener diode	FBM-Z104
CR2	Rectifier	FBL-00-030
CR3	Same as CR2	
CR4	Not used	
CR5	Not used	
CR6	Rectifier, zener diode	FBM-Z103
CR7	Same as CR2	
Q1	Transistor, NPN	FBN-L110
Q2	Same as Q1	
Q3	Same as Q1	
Q4	Not used	
Q7	Not used	
R3	Res., ww, 1,200 ohms ± 3%, 2w	DFS-12-030
R4*	Res., film, 15,000 ohms ±2%, 1/2w	DCT-15-013
R5	Res., film, 220 ohms ±2%, 1/2w	DCR-22-005
R6	Res., comp., 180,000 ohms ± 10% 1/2w	DEB-1841
R7	Res., film, 3,900 ohms ± 5%, 1/2w	DCS-39-014
R8	Res., comp., 4,700 ohms ± 10%, 1/4w	DCB4721
R9	Res., comp., 150 ohms ± 10%, 1/4w	DCB-1511
R10	Res., comp., 2200 ohms ± 10%, 1/2w	DEB-2221
R11	Res., comp., 22,000 ohms ± 10%, 1/2w	DEB-2231
R12	Res., comp., 47 ohms ±10%, 1/2w	DEB-4701
R13*	Res., ww, 600 ohms ±3%, 3w	DFR-60-005
R14	Not used	
R15	Not used	
R17	Res., var., ww, 1,200 ohms ±10%, 1-1/2w	DNS-12-026
R19 Thru R21	Not used	
R22	Res., comp., 1200 ohms ± 10%, 1/2w	DEB-1221
R23	Res., comp., 68 ohms ±10%, 1/2w	DEB-6801
R24	Not used	
R25	Not used	
R27	Not used	

*This part not used on units with "Y" option.

UNIQUE PARTS

MODEL LM-C8

C3	Cap., elect., 900 mfd, - 10% +100%, 35 vdc	CBR90-040
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 3,000 mfd, -10% +100%, 35 vdc	CBS30-040
CR8	Rectifier	FBL00-054
CR9-CR11	Same as CR8	

UNIQUE PARTS (Cont)

MODEL LM-C8 (Cont)

Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN36486
Q8	Transistor, NPN	FBN36485
Q9	Same as Q8	
R1	Res., var., ww, 1,000 ohms, ±5%, 5w	DNS10-027
R2	Res., ww, 1,200 ohms, ±3%, 2w	DFS12-030
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 2,400 ohms ± 5%, 1/2w	DCS24-001
R26	Res., ww, 0.39 ohms, ±5%, 5w	DFM39-046
R28	Same as R26	
T1	Transformer	ABA-C8

MODEL LM-C10

C3	Cap., elect., 900 mfd, - 10% +100%, 35 vdc	CBR90-040
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 3,000 mfd, -10% +100%, 35 vdc	CBS30-040
CR8	Rectifier	FBL-00-054
CR9-CR11	Same as CR8	
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN36486
Q8	Transistor, NPN	FBN36485
Q9	Same as Q8	
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS22-056
R2	Res., ww, 1,200 ohms, ±3%, 2w	DFS12-030
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 2,400 ohms ±5%, 1/2w	DCS24-001
R26	Res., ww, 0.56 ohms, ±5%, 5w	DFM56-047
R28	Same as R26	
T1	Transformer	ABA-C10

MODEL LM-C12

C3	Cap., elect., 900 mfd, - 10% +100%, 35 vdc	CBR90-040
C6	Cap., mylar 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 3,000 mfd, -10% +100%, 35 vdc	CBS30-040
CR8	Rectifier	FBL-00-054
thru CR11		
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN36486
Q8	Transistor, NPN	FBN36485
Q9	Same as Q8	
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS22-056
R2	Res., ww, 1,800 ohms ±3%, 3w	DFS18-048
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 2,400 ohms ±5%, 1/2w	DCS24-001

UNIQUE PARTS (Cont)

MODEL LM-C12 (Cont.)

CIRC. DES.	DESCRIPTION	LAMBDA NO.
R26	Res., ww, 0.68 ohms ±5%, 5w	DFM68-048
R28	Same as R26	
T1	Transformer	ABA-C12

MODEL LM-C15

C3	Cap., elect., 900 mfd, - 10% +100%, 35 vdc	CBR90-040
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 3,000 mfd, -10% +100%, 35 vdc	CBS30-040
CR8	Rectifier	FBL00-054
CR9-CR11	Same as CR8	
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN35469
Q8	Transistor, NPN	FBN36220
Q9	Same as Q8	
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS22-056
R2	Res., ww, 1,800 ohms ±3%, 3w	DFS18-048
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 2,400 ohms ±5%, 1/2w	DCS24-001
R26	Res., ww, 0.68 ohms, ±5%, 5w	DFM68-048
R28	Same as R26	
T1	Transformer	ABA-C15

MODEL LM-C18

C3	Cap., elect., 900 mfd, - 10% +100%, 35 vdc	CBR90-040
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 3,000 mfd, -10% +100%, 35 vdc	CBS30-040
CR8	Rectifier	FBL00-054
CR9-CR11	Same as CR8	
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN35469
Q8	Transistor, NPN	FBN36220
Q9	Same as Q8	
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS22-056
R2	Res., ww, 2,500 ohms ±3%, 3w	DFS25-036
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 6,800 ohms, ±5%, 1/2w	DCS68-021
R26	Res., ww, 0.68 ohms, ±5%, 5w	DFM68-048
R28	Same as R26	
T1	Transformer	ABA-C18

MODEL LM-C20

C3	Cap., elect., 500 mfd, - 10%, +100%, 60 vdc	CBR50-041
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005

UNIQUE PARTS (Cont)

MODEL LM-C20 (Cont.)

CIRC. DES.	DESCRIPTION	LAMBDA NO.
C8	Cap., elect., 1,500 mfd, -10% +100%, 60 vdc	CBS15-039
CR8	Rectifier	FBL00-054
CR9-CR11	Same as CR8	
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN36488
Q8	Transistor, NPN	FBN36487
Q9	Same as Q8	
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS22-056
R2	Res., ww, 2,500 ohms ±3%, 3w	DFS25-036
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 6,800 ohms ±5%, 1/2w	DCS68-021
R26	Res., ww, 0.75 ohms ±5%, 5W	DFM75-044
R28	Same as R26	
T1	Transformer	ABA-C20

MODEL LM-C24

C3	Cap., elect., 500 mfd, -10% +100%, 60 vdc	CBR50-041
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 1,500 mfd, -10% +100%, 60 vdc	CBS15-039
CR8	Rectifier	FBL00-054
CR9-CR11	Same as CR8	
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN36488
Q8	Transistor, NPN	FBN36487
Q9	Same as Q8	
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS22-056
R2	Res., ww, 3,600 ohms ±3%, 3w	DFS36-050
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 6,800 ohms ±5%, 1/2w	DCS68-021
R26	Res., ww, 1.0 ohm ±3%, 5w	DFN10-014
R28	Same as R26	
T1	Transformer	ABA-C24

MODEL LM-C28

C3	Cap., elect., 500 mfd, -10% +100%, 60 vdc	CBR50-041
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 1,500 mfd, -10% +100%, 60 vdc	CBS15-039
CR8	Rectifier	FBL00-054
CR9-CR11	Same as CR8	
Q5	Transistor, NPN	FBN-L109
Q6	Transistor, NPN	FBN36488
Q8	Transistor, NPN	FBN36487
Q9	Same as Q8	

UNIQUE PARTS (Cont)

MODEL LM-C28 (Cont)

CIRC. DES.	DESCRIPTION	LAMBDA NO.
R1	Res., var., ww, 2,200 ohms, ±5%, 5w	DNS22-056
R2	Res., ww, 4,500 ohms, ±3%, 3w	DFS45-044
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 6,800 ohms, ±5%, 1/2w	DCS68-021
R26	Res., ww, 1.25 ohms, ±3%, 3w	DFN13-051
R28	Same as R26	
T1	Transformer	ABA-C28

MODEL LM-C36

C3	Cap., elect., 500 mfd -10% +100%, 60 vdc	CBR50-041
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 1,500 mfd, -10% +100%, 60 vdc	CBS15-039
CR8	Rectifier	FBL00-054
thru CR11		
Q5	Transistor NPN	FBN-L108
Q6	Transistor NPN	FBN36488
Q8	Transistor NPN	FBN36487
Q9	Same as Q8	
R1	Res., var., ww, 3,300 ohms, ±5%, 5w	DNS33-057
R2	Res., ww, 5,600 ohms, ±3%, 3w	DFS56-053
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 10,000 ohms, ±5%, 1/2w	DCT10-008
R26	Res., ww, 1.25 ohms, ±3%, 3w	DFN13-051
R28	Same as R26	
T1	Transformer	ABA-C36

MODEL LM-C48

C3	Cap., elect., 200 mfd,-10% +100%, 100vdc	CBR20-043
C6	Cap., mylar, 0.01 mfd, ±10%, 200 vdc	CGL10-002
C8	Cap., elect., 600 mfd, -10% +100%, 100 vdc	CBR60-042
CR8	Rectifier	FBL00-054
CR9-CR11	Same as CR8	
Q5	Transistor NPN	FBN-L108
Q6	Transistor NPN	FBN35903
Q8	Transistor NPN	FBN36487
Q9	Same as Q8	
R1	Res., var., ww, 3,300 ohms, ±5%, 5w	DNS33-057
R2	Res., ww, 8,000 ohms, ±3%, 3w	DFS80-054
R16	Res., comp., 3,900 ohms ±10%, 1/2w	DEB3921

UNIQUE PARTS (Cont)

MODEL LM-C48 (Cont)

CIRC. DES.	DESCRIPTION	LAMBDA NO.
R18	Res., film, 10,000 ohms, ±5%, 1/2w	DCT10-008
R26	Res., ww, 1.5 ohms, ±3%, 3w	DFN15-042
R28	Same as R26	
T1	Transformer	ABA-C48

MODEL LM-C60

C3	Cap., elec., 200 mfd, -10% +100%, 100 vdc	CBR20-043
C6	Cap., mylar, 0.018 mfd, ±10%, 200 vdc	CGL18-005
C8	Cap., elec., 600 mfd, -10% +100%, 100 vdc	CBR60-042
CR8	Rectifier	FBL00-054
CR9-CR11	Same as CR8	
Q5	Transistor NPN	FBN-L108
Q6	Transistor NPN	FBN35903
Q8	Transistor NPN	FBN35902
Q9	Same as Q8	
R1	Res., var., ww, 4,500 ohms, ±5%, 5w	DNS45-050
R2	Res., ww, 10,000 ohms, ±3%, 3w	DFT10-042
R16	Res., comp., 820 ohms ±10%, 1/2w	DEB8211
R18	Res., film, 15,000 ohms, ±5%, 1/2w	DCT10-008
R26	Res., ww, 1.5 ohms, ±3%, 3w	DFN15-042
R28	Same as R26	
T1	Transformer	ABA-C60

MODELS LM-C100, LM-C120, LM-C150

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL33-006
C2	Cap., mylar, 0.068 mfd ±10%, 400 vdc	CGL68-004
C3	Cap., elect., 90 mfd-10%, +100%, 250 vdc	CBP90-015
C4	Cap., elect., 3.5 mfd-10%, +100%, 300 vdc	CBN35-018
C5	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL10-002
C6	Same as C5	
C7*	Cap., elect., 140 mfd-10% +100% 38 vdc	CBR14-030
C8	Cap., elect., 250 mfd-10% +100%, 250 vdc	CBR25-046
C9, C10	Not assigned	
C11	Cap., mylar, 0.033 mfd ±10% 400 vdc	CGL33-006
C12	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK10-004
C13	Cap., mylar, 0.022 mfd ±10%, 200 vdc	CGL22-001

MODELS LM-C100, LM-C120, LM-C150 (Cont)

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
C14	Same as C13	
C15-C29	Not assigned	
C30	Cap., mylar, 0.0033 mfd ±10%, 200 vdc	CGK33-003
CR1*	Rectifier, zener diode	FBM-Z104
CR2	Rectifier	FBL00-030
CR3	Same as CR2	
CR4, CR5	Not assigned	
CR6	Rectifier, zener diode	FBM-Z103
CR7	Same as CR2	
Q1	Transistor, NPN	FBN-L110
Q2	Same as Q1	
Q3	Same as Q1	
Q4	Not assigned	
Q5	Transistor, NPN	FBN-L108
Q6, Q7	Not assigned	
Q8	Same as Q5	
Q9	Transistor, NPN	FBN35902
Q10	Same as Q9	
R1	Res., var., ww, 9,000 ohms ±5%, 5w	DNS90-058
R3	Res., ww, 1,200 ohms ±3%, 2w	DFS12-030
R4*	Res., film, 15,000 ohms ±2%, 1/2w	DCT15-013
R5	Res., film, 220 ohms ±2%, 1/2w	DCR22-005
R6	Res., comp., 180,000 ohms ±10%, 1/2w	DEB1841
R7	Res., film, 3900 ohms ±5%, 1/2 w	DCS39-014
R8	Res., comp., 4700 ohms ±10%, 1/4w	DCB4721
R9	Res., comp., 150 ohms ±10%, 1/4w	DCB1511
R10	Res., comp., 3900 ohms ±10%, 1/2w	DEB3921
R11	Res., comp., 22,000 ohms ±10%, 1/2w	DEB2231
R12	Res., comp., 47 ohms ±10%, 1/2w	DEB4701
R13*	Res., ww, 600 ohms ±3%, 3w	DFR60-005
R14, R15	Not assigned	
R16	Res., comp., 4700 ohms ±10%, 1/2w	DEB4721
R17	Res., var., ww, 1200 ohms ±10%, 1-1/2w	DNS12-026
R19	Not assigned	
R20	Res., comp., 220 ohms ±10%, 1/2w	DEB2211
R21, R22	Not assigned	
R23	Same as R20	
R24	Res., film, 27,000 ohms ±10%, 2 w	DCT27-021
R25-R27	Not assigned	
R29-R35	Not assigned	
R36, R37	Res., ww, 6000 ohms ±3%, 5 w	DFS60-056

*This component not used on units with "Y" option

UNIQUE PARTS

MODEL LM-C100

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
CR8	Rectifier	FBL-00-033
CR9-CR11	Same as CR8	
R2	Res., ww, 16,000 ohms ±3%, 5 w	DFT16-039
R18	Res., film, 39,000 ohms ±5%, 1/2 w	DCT39-015
R28	Res., ww, 3.0 ohms ±3%, 3 w	DFN30-023
T1	Transformer	ABA-C100

MODEL LM-C120

CR8	Rectifier	FBL-00-033
CR9-CR11	Same as CR8	
R2	Res., ww, 20,000 ohms ±3%, 5 w	DFT20-040
R18	Res., film, 43,000 ohms ±5%, 1/2 w	DCT43-016
R28	Res., ww, 3.0 ohms ±3%, 3 w	DFN30-023
T1	Transformer	ABA-C120

MODEL LM-C150

CR8	Rectifier	FBL-00-064
CR9-CR11	Same as CR8	
R2	Res., ww, 26,000 ohms ±3%, 5 w	DFT-26-041
R18	Res., film, 56,000 ohms ±5%, 1 w	DCT-56-017
R28	Res., ww, 6.0 ohms ±3%, 3 w	DFN60-054
T1	Transformer	ABA-C150

MODELS LM-225, LMC-0-14, LMC-0-32

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL33-006
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM22-003
C4	Cap., elect., 3.0 mfd -10% + 75%, 100 vdc	CBN30-015
C5	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL10-002
C7*	Cap., elect., 140 mfd -10% + 100%, 38 vdc	CBR14-030
C9	Cap., mylar, 0.022 mfd ±10%, 200 vdc	CGL-22-001
C10	Same as C9	
C11	Not assigned	
CR1*	Rectifier, zener diode	FBM-Z104
CR2	Rectifier	FBL-00-030
CR3+	Same as CR2	
CR4	Not assigned	
CR5+	Same as CR2	
CR6	Rectifier, zener diode	FBM-Z103
CR7	Same as CR2	
Q1	Transistor, NPN	FBN-L110
Q2++	Same as Q1	
Q3++	Same as Q1	

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
Q3+	Same as Q1 (Vtge amp.)	
Q4	Not assigned	
Q5	Transistor, NPN	FBN-L109
Q7	Not assigned	
R2	Not assigned	
R3	Res., ww, 1100 ohms ±3%, 2 w	DFS11-061
R4*	Res., film, 15,000 ohms ±2%, 1/2 w	DCT15-013
R5	Res., film, 220 ohms ±2%, 1/2 w	DCR22-005
R6	Res., comp., 180,000 ohms ±10%, 1/2 w	DEB1841
R7	Res., film, 3,900 ohms ±5%, 1/2 w	DCS39-014
R8	Res., comp., 4,700 ohms ±10%, 1/4 w	DCB4721
R9	Res., comp., 150 ohms ±10%, 1/4 w	DCB1511
R11, R12	Not assigned	
R13*	Res., ww, 600 ohms ±3%, 3 w	DFR60-005
R14, R15	Not assigned	
R17	Res., var., ww, 1200 ohms ±10%, 1 1/2 w	DNS12-026
R18	Not assigned	
R21	Not assigned	
R22	Res., comp., 1200 ohms ±10%, 1/2 w	DEB1221
R24, R25	Not assigned	
R27	Not assigned	

*This component not used on units with "Y" option
+This part only used on units with serial no. prefix A
++This part not used on units bearing serial no. prefix A

UNIQUE PARTS

MODEL LM-225

C3	Cap., elect., 1000 mfd -10% + 100%, 28 vdc	CBS10-025
C6	Cap., mylar, 0.0068 mfd ±10%, 200 vdc	CGK68-001
C8	Cap., elect., 6000 mfd -10% + 100%, 20 vdc	CBS60-037
C12+	Cap., mylar, 0.001 mfd ±10%, 200 vdc	CGK10-004
CR8	Rectifier	FBL00-054
CR9	Not assigned	
CR10	Same as CR8	
CR11	Same as CR8	
CR12	Not assigned	
CR13	Not assigned	
Q6	Transistor, NPN	FBN36486
Q8	Transistor, NPN	FBN36485
Q9	Same as Q8	
R1	Res., var., ww, 2200 ohms, ±5%, 5 w	DNS22-056
R10	Res., comp., 3900 ohms ±10%, 1/2 w	DEB3921
R16	Res., comp., 1800 ohms ±10%, 1/2 w	DEB1821
R19	Res., comp., 1800 ohms ±10%, 1 w	DGB1821
R20	Res., ww, 300 ohms ±3%, 3 w	DFR30-014
R23	Res., comp., 100 ohms ±10%, 1/2 w	DEB1011

MODEL LM-225 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
R26	Res., ww, 0.68 ohm ±5%, 5 w	DFM68-048
R28	Same as R26	
T1	Transformer	ABA-225

+This part not used on units with serial no. prefixes A, B

MODEL LMC-0-14

C3	Cap., elect., 900 mfd -10% + 100%, 35 vdc	CBR90-040
C6	Cap., mylar, 0.018 mfd ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 3000 mfd -10% + 100%, 35 vdc	CBS30-040
C12	Not assigned	
CR8	Rectifier	FBL00-054
CR9	Not assigned	
CR10	Same as CR8	
CR11	Same as CR8	
CR12	Not assigned	
CR13	Not assigned	
Q6	Transistor, NPN	FBN36486
Q8	Transistor, NPN	FBN36485
Q9	Same as Q8	
R1	Res., var., ww, 2200 ohms ±5%, 5 w	DNS22-056
R10	Res., comp., 2200 ohms ±10%, 1/2 w	DEB2221
R16	Res., comp., 820 ohms ±10%, 1/2 w	DEB8211
R19	Not assigned	
R20	Res., ww, 300 ohms ±3%, 3 w	DFR30-014
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB6801
R26	Res., ww, 0.75 ohms ±5%, 5 w	DFM75-044
R28	Same as R26	
T1	Transformer	ABA-C014

MODEL LMC-0-32

C3	Cap., elect., 500 mfd -10% + 100 %, 60 vdc	CBR50-041
C6	Cap., mylar, 0.018 mfd ±10%, 200 vdc	CGL18-005
C8	Cap., elect., 1500 mfd -10% + 100%, 60 vdc	CBS15-039
C12	Not assigned	
CR8	Not assigned	
CR9	Rectifier	FBL00-036
CR10	Not assigned	
CR11	Same as CR9	
CR12, CR13	Rectifier	FBL00-054
Q6	Transistor, NPN	FBN36488
Q8	Transistor, NPN	FBN36487
Q9	Same as Q8	
R1	Res., var., ww, 9000 ohms ±5%, 5 w	DNS90-058
R10	Res., comp., 2200 ohms ±10%, 1/2 w	DEB2221
R16	Res., comp., 820 ohms ±10%, 1/2 w	DEB8211
R19	Not assigned	

UNIQUE PARTS (Cont)

MODEL LMC-0-32 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
R20	Res., ww, 470 ohms ±2%, 10 w	DFR47-048
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB6801
R26	Res., ww, 1.5 ohms ±3%, 3 w	DFN15-042
R28	Same as R26	
T1	Transformer	ABA-C032

PARTS FOR MODEL LMC-0-60

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL33-006
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM22-003
C3	Cap., elect., 200 mfd -10% + 100%, 100 vdc	CBR20-043
C4	Cap., elect., 3.0 mfd -10% + 75%, 100 vdc	CBN30-015
C5	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL10-002
C6	Same as C5	
C7*	Cap., elect., 140 mfd -10% + 100%, 38 vdc	CBR14-030
C8	Cap., elect., 600 mfd -10% + 100%, 100 vdc	CBR60-042
C9, C10	Not assigned	
C11	Cap., mylar, 0.022 mfd ±10%, 200 vdc	CGL22-001
CR1*	Rectifier, zener diode	FBM-Z104
CR2	Rectifier	FBL-00-030
CR3-CR5	Not assigned	
CR6	Rectifier, zener diode	FBM-Z103
CR7	Same as CR2	
CR8	Rectifier	FBL-00-036
CR11		
CR12-CR15	Rectifier	FBL-00-054
Q1	Transistor, NPN	FBN-L110
Q2	Same as Q1	
Q3	Same as Q1	
Q4	Not assigned	
Q5	Transistor, NPN	FBN-L108
Q6	Transistor, NPN	FBN35903
Q7	Not assigned	
Q8	Transistor, NPN	FBN-35902
Q9	Same as Q8	
R1	Res., var., ww, 13,000 ohms ±5%, 5 w	DNT-13-032
R2	Not assigned	
R3	Res., ww, 1,100 ohms ±3%, 2 w	DFS-11-061
R4*	Res., film, 15,000 ohms ±2%, 1/2 w	DCT-15-013
R5	Res., film, 220 ohms ±2%, 1/2 w	DCR-22-005
R6	Res., comp., 180,000 ohms ±10%, 1/2 w	DEB-1841
R7	Res., film, 3,900 ohms ±5%, 1/2 w	DCS-39-014
R8	Res., comp., 4,700 ohms ±10%, 1/4 w	DCB-4721
R9	Res., comp., 150 ohms ±10%, 1/4 w	DCB-1511
R10	Res., comp., 2,200 ohms ±10%, 12/ w	DEB-2221
R11, R12	Not assigned	

UNIQUE PARTS (Cont)

MODEL LMC-0-60 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
R13*	Res., ww, 600 ohms ±3%, 3 w	DFR-60-005
R14, R15	Not assigned	
R16	Res., comp., 3,900 ohms ±10%, 1/2 w	DEB-3921
R17	Res., var., ww, 1,200 ohms ±10%, 1-1/2 w	DNS-12-026
R18, R19	Not assigned	
R20	Res., ww, 900 ohms ±5%, 10 w	DFR-90-049
R21	Not assigned	
R22	Res., comp., 1,200 ohms ±10%, 1/2 w	DEB-1221
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801
R24, R25	Not assigned	
R26	Res., ww, 3.0 ohms ±3%, 3 w	DFN-30-023
R27	Not assigned	
R28	Same as R26	
T1	Transformer	ABA-C060

*This component not used on models with "Y" option

PARTS FOR "MP" OPTION

MODELS MP-3, MP-5, P-3, P-5

DS1	Pilot light assembly (ALL)	HRD 00-007
F1	Fuse, 3AG, "SLO-BLO", 3.0 amperes, (LM 225 thru LM-C150)	FFC 03-000
F1	Fuse, 3AG, "SLO-BLO", 1.5 amperes (LMC-0-14 thru LMC-0-60)	FFC-01-500
XF1	Fuseholder (ALL)	HRK 00-007
M1*	Meter, volts, D.C., 0-5 vdc (LM-C3 thru LM-C4P5)	EBN 50-003
M1*	Meter, volts, D.C., 0-8 vdc (LM-C5, LM-C6)	EBN 80-005
M1*	Meter, volts, D.C., 0-10 vdc (LM225, LM-C8)	EBP10-016
M1*	Meter, volts D.C., 0-15 vdc (LM226, LM-C10, LM-C12, LM-C0-14)	EBP15-017
M1*	Meter, volts, D.C., 0-20 vdc (LM-C15, LM-C18)	EBP 20-014
M1*	Meter, volts, D.C., 0-25 vdc (LM227, LM-C20)	EBP 25-018
M1*	Meter, volts, D.C., 0-40 vdc (LM228, LM-C24, C28, C36, LM-C0-32)	EBP 40-013
M1*	Meter, volts, D.C., 0-60 vdc (LM229, LM-C48, LM-C0-60)	EBP 60-015
M2*	Meter, amperes, D.C., 0-6 amperes (LM-C3 thru LM-C5)	EDN 60-018
M2*	Meter, amperes, D.C., 0-1.0 amperes, (LM-C100, LM-C-0-60)	EDN-10-014
M2*	Meter, amperes, D.C., 0-5 amperes, (LM225, LM226, LM-C6 thru LM-C20)	EDN 50-021
M2*	Meter, amperes, D.C., 0-3 amperes, (LM227, LM-C24, LM-C28, LMC-0-14)	EDN 30-019

PARTS FOR "MP" OPTION (Cont)

MODELS MP-3, MP-5, P-3, P-5 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
M2*	Meter, amperes, D.C., 0-2 amperes, (LM228, LM-C36, LM-C48)	EDN 20-022
M2*	Meter, amperes, D.C., 0-0.5 amperes (LM-C120, LM-C150)	EDM-50-034
M2*	Meter, amperes, D.C., 0-1.5 amperes, (LM229, LMC-60, LMC-0-32)	EDN 15-020
R1	Res., var., ww, 2,200 ohms ±5%, 5w (LM225, LM226, LM-C10 thru LM-C28)	DNS 22-053
R1	Res., var., ww, 4,500 ohms ±5%, 5w (LM227, LM228, LM-C60)	DNS 45-059
R1	Res., var., ww. 9000 ohms ohms ±5%, 5w, (LM229, LM-C100 thru 150, LMC-0-32)	DNS 90-051
R1	Res., var., ww, 300 ohms ±5%, 5 w (LM-C3)	DNR 30-018
R1	Res., var, ww, 600 ohms ±5%, 5 w (LM-C3P3 thru LM-C6)	DNR 60-026
R1	Res., var., ww, 1,000 ohms ±5%, 5 w (LM-C8)	DNS 10-032
R1	Res., var., ww, 3,300 ohms ±5%, 5 w (LM-C36, LM-C48, LMC-0-014)	DNS 33-054
R1	Res., var., ww, 13,000 ohms ±5%, 5 w (LMC-0-60)	DNT-13-031
S1**	Switch, SPST, (ALL)	FDA 11-001
S1+	Switch, SPST, (ALL)	FDA 11-040
C1, C2	Cap., tant., 2.5 mfd -15 + 75%, 100 vdc (ALL)	CBN-25-010
M1*	Meter, volts, D.C., 0-80 vdc, (LM-C60)	EBP-80-019
M1*	Meter, volts, D.C., 0-120 vdc, (LM-C100)	EBR-12-075
M1*	Meter, volts, D.C., 0-150 vdc (LM-C120)	EBR-15-076
M1*	Meter, volts, D.C., 0-200 vdc (LM-C150)	EBR-20-077

*This part only used on MP-3, MP-5
**This part only used on MP-3, P-3
+ This part only used on MP-5, P-5

PARTS FOR "OV" OPTION

MODELS LM0V-1, LM0V-2, LM0V-3

COMMON PARTS

C1	Cap., mylar, 0.01 mfd ±20%, 80 vdc	CGL-10-008
Q1	Transistor, NPN	FBN-L102
R3	Res., film, 200 ohms ±5%, 1/2 w	DCR-20-010
R4	Res., thermistor, 425 ohms ±5%, 1-1/4 w	DKR-43-004
R5	Res., comp., 1,200 ohms ±10%, 1/2 w	DEB-1221
R6	Same as R5	
R8	Res., comp., 15,000 ohms ±10%, 1/2 w	DEB-1531
R10	Same as R5	
SCR1	Rectifier, silicon, controlled	FBP-00-009

UNIQUE PARTS

MODEL LM0V-1

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.
Q2	Transistor, PNP	FBN-L103
R1	Res., var., ww or cermet, 2,000 ohms ±10%, 3/4 w	DNS-20-034
R2	Res., film, 560 ohms ±2%, 1/2 w	DCR-56-002
R7	Res., comp., 33 ohms ±5%, 1/4 w	DCB-3305
R9	Not used	

MODEL LM0V-2

Q2	Transistor, PNP	FBN-L103
R1	Res., var., ww or cermet, 5,000 ohms ±10%, 3/4 w	DNS-50-036
R2	Res., film, 1,470 ohms ±10%, 1/2 w	DCS-15-031
R7	Res., comp., 33 ohms ±5%, 1/4 w	DCB-3305
R9	Not used	

MODEL LM0V-3

Q2	Transistor, PNP	FBN-L114
R1	Res., var., ww or cermet, 20,000 ohms ±10%, 3/4 w	DNT-20-010
R2	Res., film, 4,700 ohms ±2%, 1/2 w	DCS-47-028
R7	Res., comp., 39 ohms ±5%, 1/4 w	DCB-3905
R9	Res., comp., 22 ohms ±10%, 1/2 w	DEB-2201

PARTS FOR "Y" OPTION

C107	Cap., elect., 40 mfd, 35 vdc	CBP-40-014
CR1	Rectifier, zener diode	FBM-Z107
CR101	Rectifier, zener diode	FBM-Z104
Q101	Transistor, NPN	FBN-L109
R4	Res., comp., 220,000 ohms ±10%, 1/2 w	DEB-2241
R101	Res., film, 6,800 ohms ±2%, 1/4 w	DCS-68-032
R102	Res., film, 220 ohms ±2%, 1/4 w	DCR-22-014

PARTS FOR "T" OPTION

ALL "C" PACKAGE MODELS EXCEPT F1 CHANGES ON LM-C8 THRU LM-C60; LMC-0-14, 0-32, 0-60

The following parts change and a resistor is added in se to DS-1 of "MP" option:

C1	Cap. mylar, 0.033 mfd ±10%, 600 vdc	CGL-33-014
F1	Fuse, "SLO-BLO", 1.50 amps. 250v	FFG-01-500
T1	Transformer	ADD SUFFIX "T" TO REG. T1 NO.
DS1-Res	Res., comp., 120K ±10%	DEB-1241

On following models F1 has different value

MODELS LM-C8 THRU LM-C60

F1	Fuse, "SLO-BLO", 2.0 amps. 250v	FFG-02-000

MODELS LMC-014, 0-32, 0-60

F1	Fuse, "SLO-BLO", 1.0 amp. 250v	FFG-01-000

MODEL -LM 225

F1	Fuse, "SLO-BLO", 1.25 amp 250V	FFG-01-250

PARTS FOR "R" OPTION

Transformer T1 changes on all "C" package models with suffix "R". For transformer T1 used on these models see standard "C" model parts list for the standard transformer part no. and add suffix "R" to the part no.

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.

PARTS FOR "V" OPTION

All "C" Package Models with the "V" Option have the same part changes as listed for the "T" Option except for capacitor C1 and transformer T1 listed below.

C1	Cap., paper, 0.01 mf ± 10%, 1000 vdc	CAL-10-021
T1	Transformer	Add Suffix "G"* to Reg. T1 No.

* Suffix "V" for units with serial no. prefixes A-C.

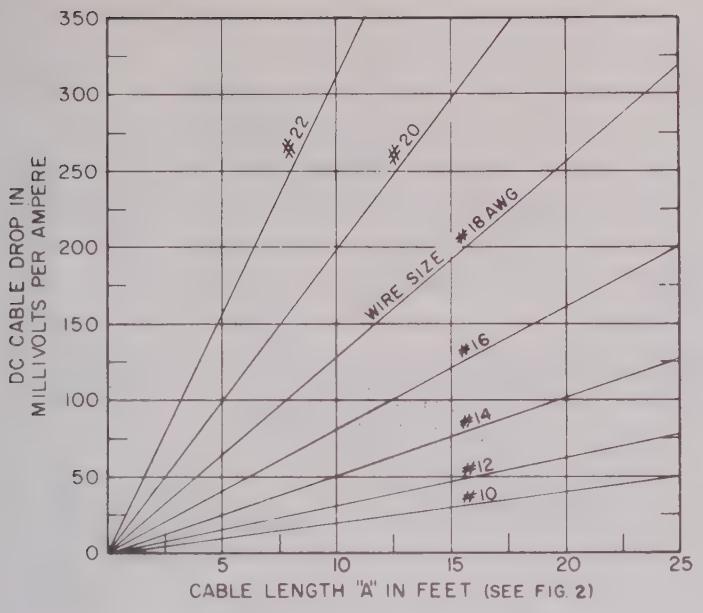


Figure 1. Cable Connection Chart

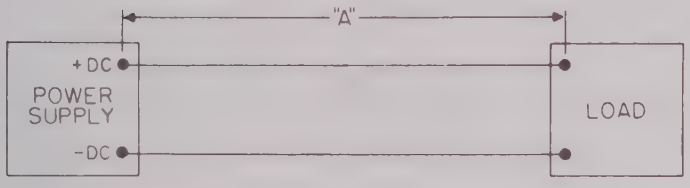
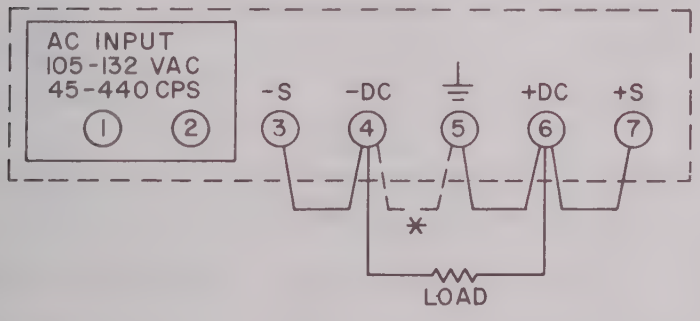
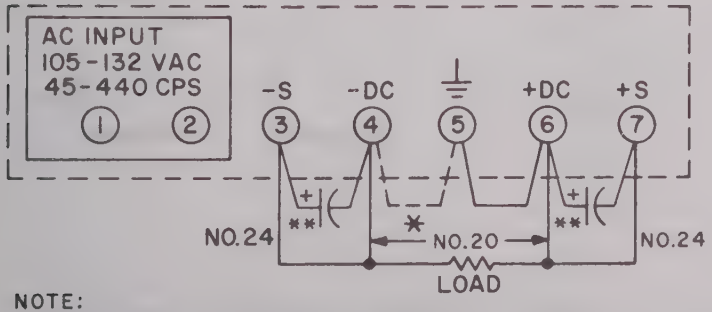


Figure 2. Cable Length "A" in Feet



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

Figure 3. Local Sensing Connections



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.
* * A 2.5MF, ELECT., CAP., MAY BE REQUIRED.

Figure 4. Remote Sensing Connections

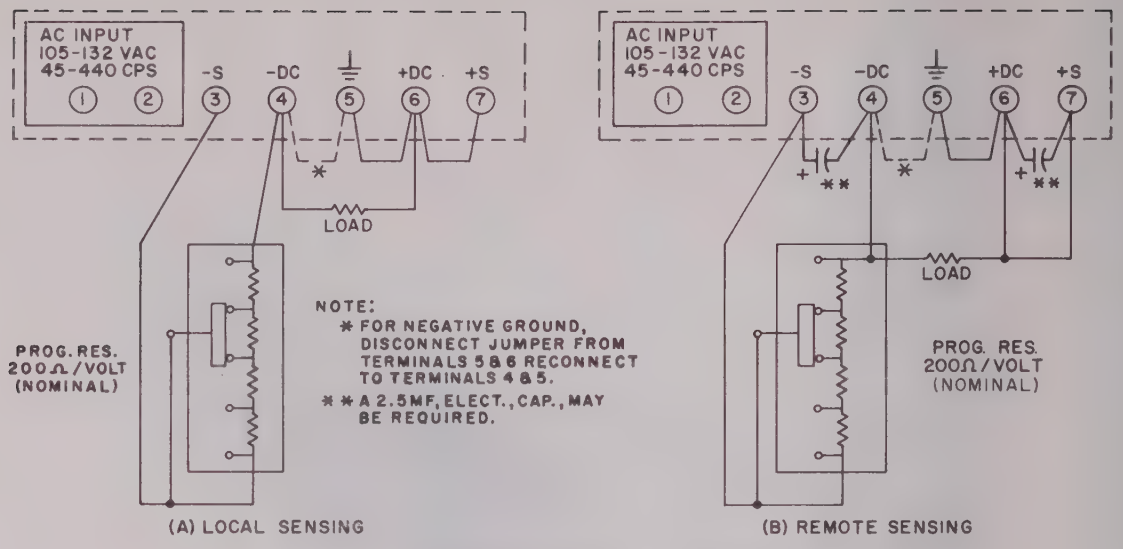


Figure 5. Programmed Voltage, with External Resistor

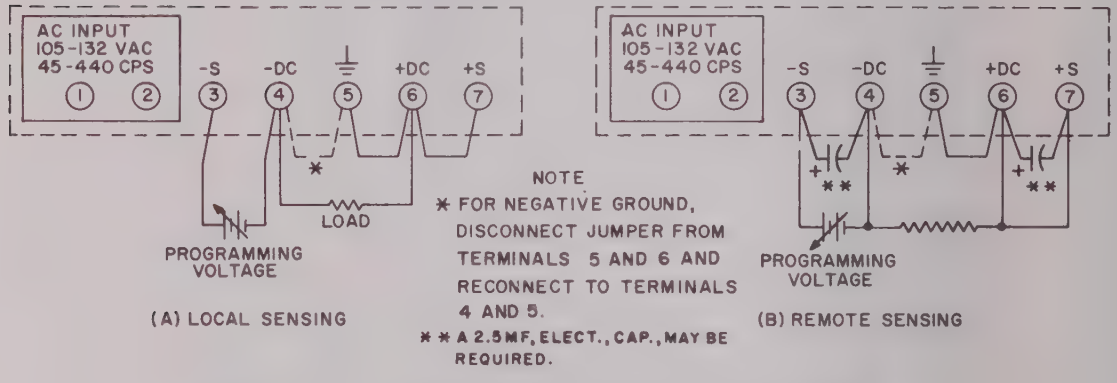


Figure 6. Programmed Voltage, with External Programming Voltage Source

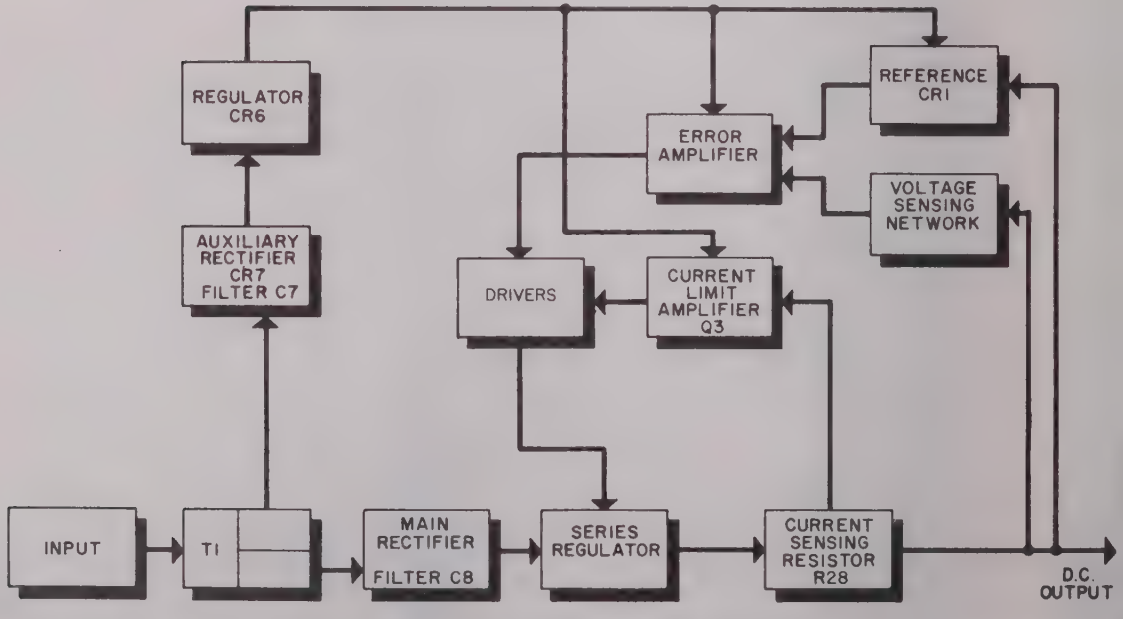


Figure 7. Typical Block Diagram

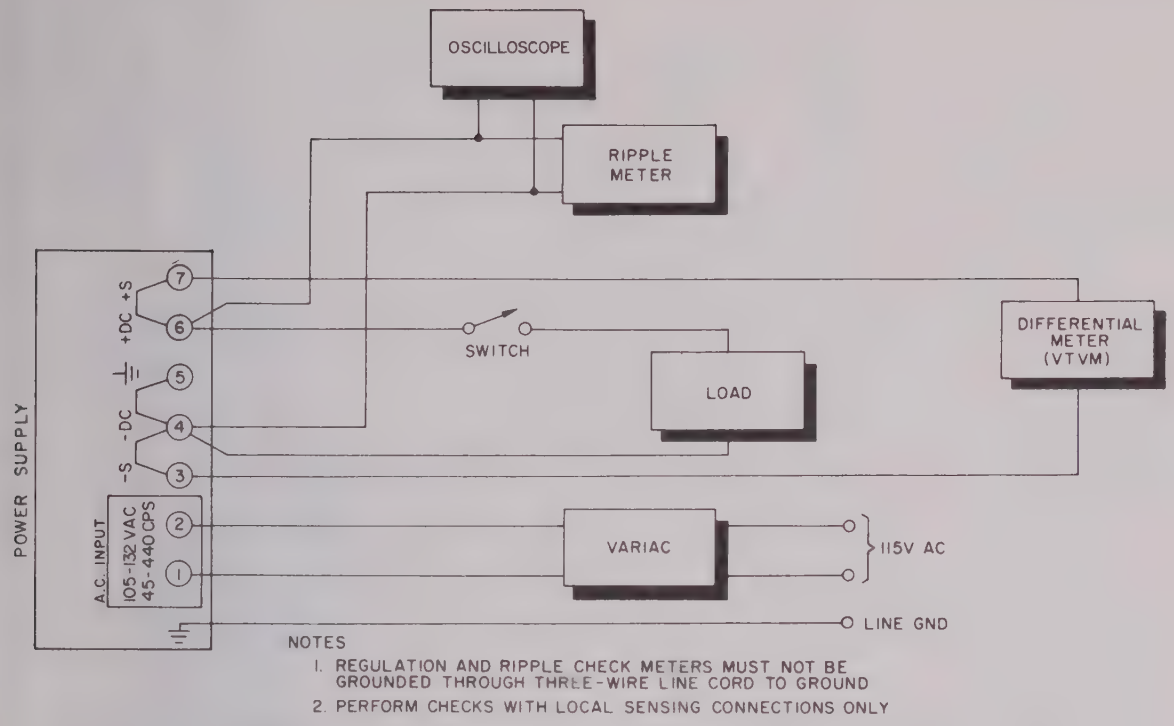


Figure 8. Test Connections for Performance Checks

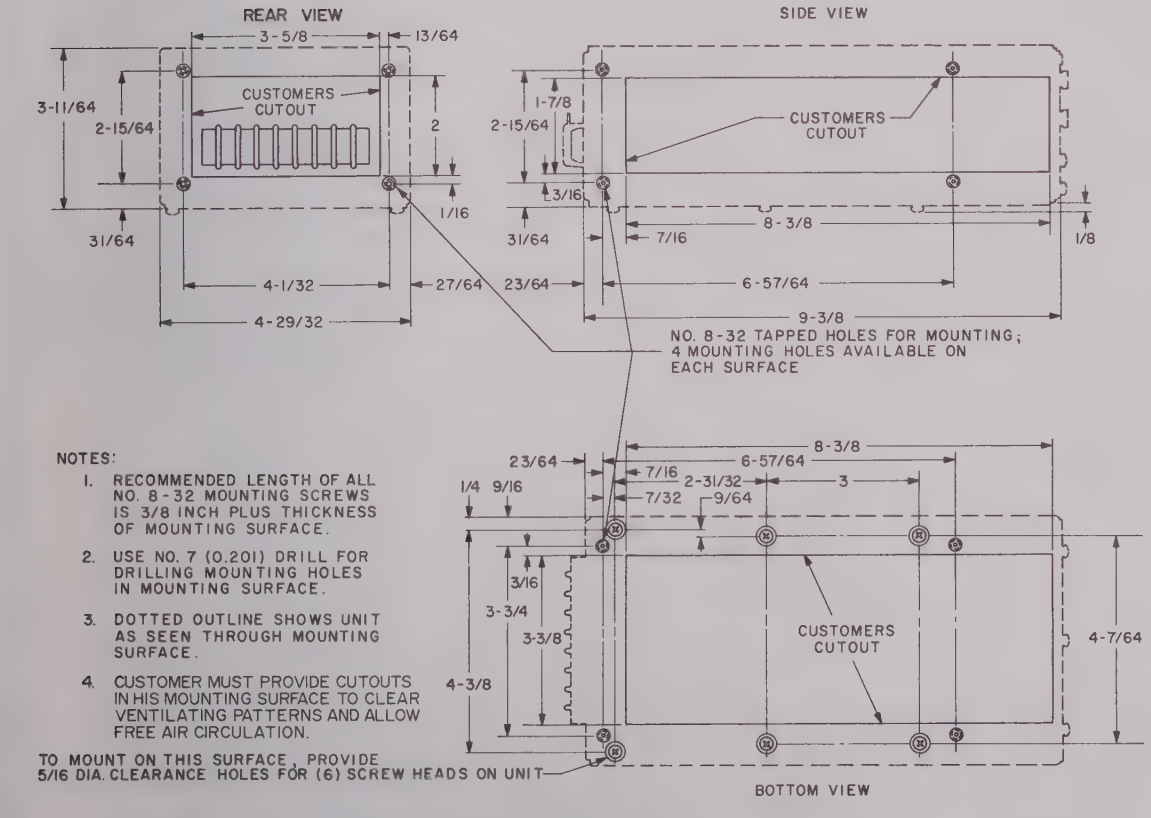
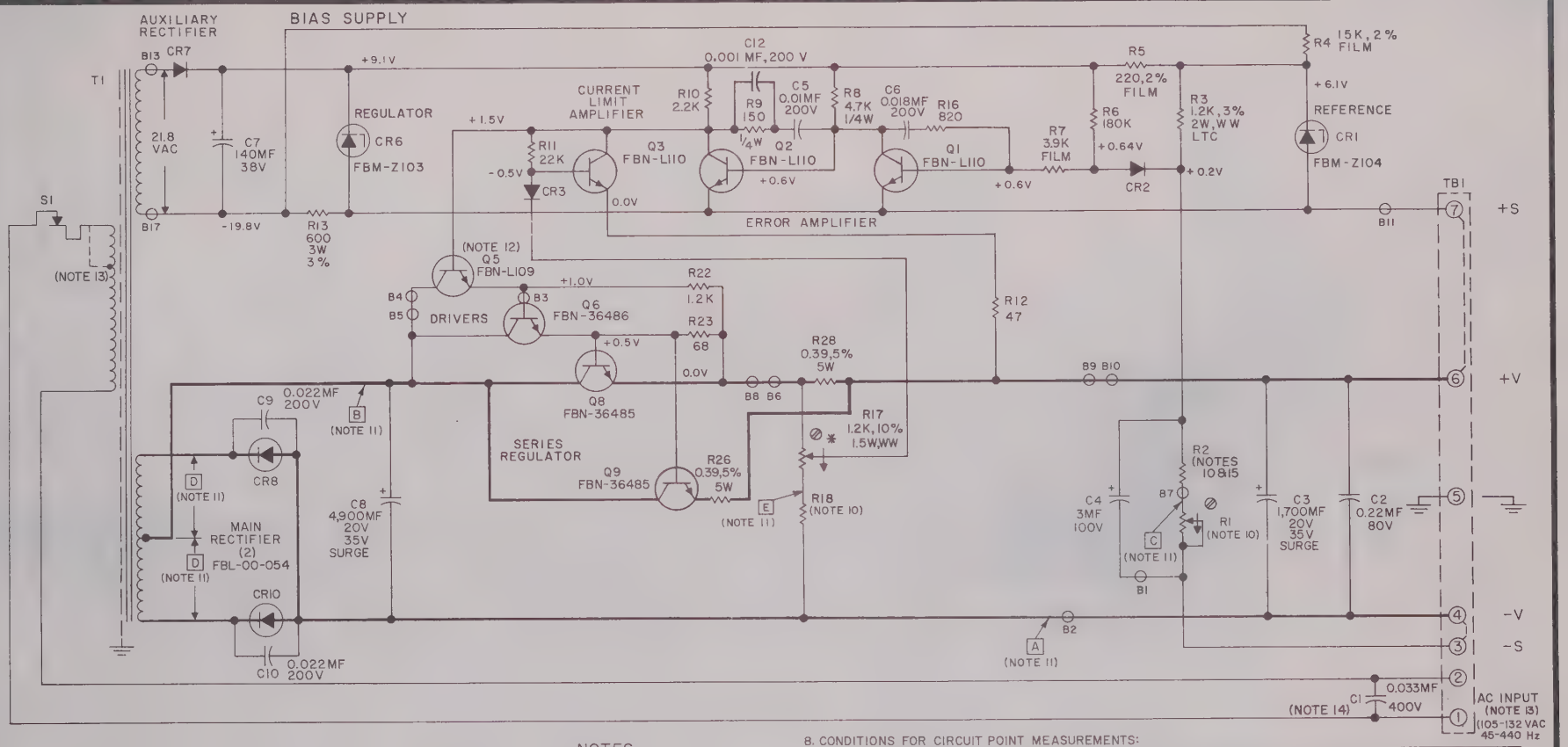


Figure 9. Recommended Mounting Cutouts



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - ↓ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⊘ INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - ⏚ INDICATES CONNECTION TO CHASSIS.
   - ▭ INDICATES ACTUAL UNIT MARKING
   - ✳ SEE INSTRUCTION MANUAL.
   - ⊣▶⊢ LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - —o— INDICATES TERMINAL ON PRINTED WIRING BOARD "B".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 CPS, FOR 360-440CPS, CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz ; OUTPUT: NOM'L VDC, NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
13. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
14. ON UNITS WITH "V" OPTION, C1 IS 0.01 MF ±10%, 1000V PAPER.
15. ON UNITS WITH "S" OPTION, R2 IS A JUMPER.

REFERENCE DESIGNATIONS NOT USED	
Q7	CR9
CR4	R19-R21
CR5	R14
Q4	R15
	R24
	R25
	R27

MODELS
LM-C3P3
LM-C3
LM-C4
LM-C4P5
LM-C5
LM-C6
LM-C3P6

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

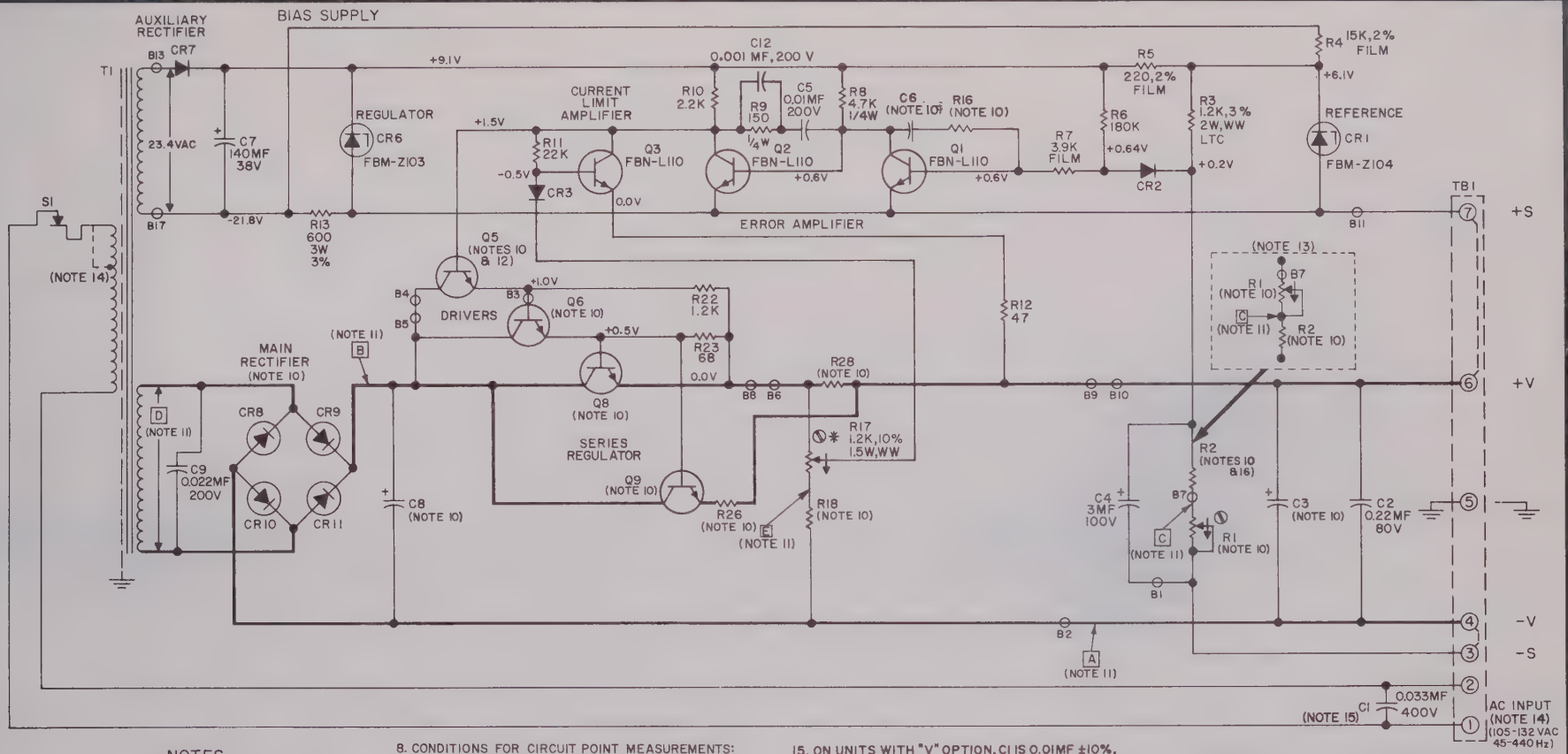
LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.

TABLE I

DATA REFERENCES FOR MODELS LM-C3 — LM-C6

Model	Voltage Range (VDC)	Max. Current (Amperes)				Schematic Voltage Measurement					Schematic Components		
											R1	R2	R18
		40°C	50°C	60°C	71°C	A VDC	B VDC	C VDC	D VAC	E VDC	±5% 5W	±3% 3W	±5% 1/2W
LM-C3	3±5%	5.3	4.6	3.7	2.5	-3.0	+15.3	-2.00	12.9	-3.0	300	430	JUMPER
LM-C3P3	3.3±5%	5.2	4.5	3.6	2.5	-3.3	+16.1	-2.2	13.7	-3.3	600	430	JUMPER
LM-C3P6	3.6±5%	5.2	4.5	3.6	2.5.	-3.6	+15.8	-2.2	13.7	-3.6	600	430	JUMPER
LM-C4	4±5%	5.2	4.5	3.6	2.5	-4.0	+15.4	-3.00	13.7	-4.0	600	600	JUMPER
LM-C4P5	4.5±5%	5.1	4.4	3.5	2.4	-4.5	+16.1	-2.80	14.5	-3.4	600	650	390
LM-C5	5±5%	5.1	4.3	3.4	2.4	-5.0	+16.3	-2.80	15.0	-2.4	600	650	1.3K
LM-C6	6±5%	4.8	4.1	3.3	2.4	-6.0	+16.7	-3.80	16.1	-2.9	600	800 2W	1.3K

SCB-C8-60A



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B"
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 CPS, FOR 360-440 CPS, CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz ; OUTPUT: NOM'L VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
13. FOR MODEL LM-C60 RI AND R2 ARE CONNECTED AS SHOWN.
14. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY) ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
15. ON UNITS WITH "V" OPTION, C1 IS 0.01MF ±10%, 1000 V, PAPER.
16. ON UNITS WITH "S" OPTION, R2 IS A JUMPER.

REFERENCE DESIGNATIONS NOT USED	
Q7	R14
Q4	R15
CR4,5	R24
R19-R21	R25
	R27

MODELS	MODELS
LM-C8	LM-C20
LM-C60	LM-C24
LM-C10	LM-C28
LM-C12	LM-C36
LM-C15	LM-C48
LM-C18	

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

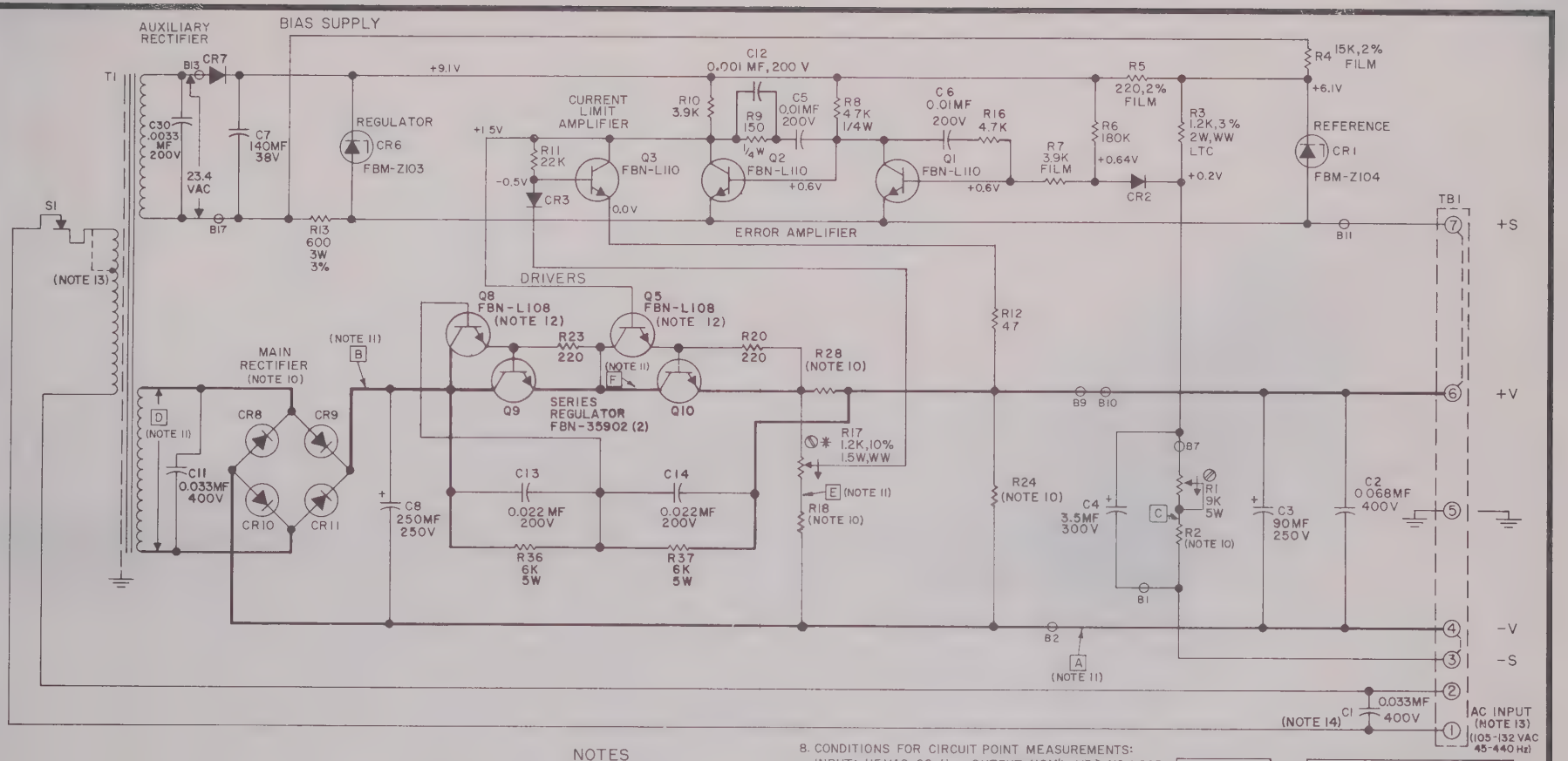
LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.

TABLE I

DATA REFERENCES FOR MODELS LM-C8 — LM-60

Model	Voltage Range (VDC)	Max. Current (Amps)				Schematic Voltage Measurement					Schematic Components										
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	E (VDC)	C3	C6	C8	CR 8-11 (FBL 00-)	Q5 (FBN-)	Q6 (FBN-)	Q8,Q9 (FBN-)	R1 5% 5W	R2 3% 3W	R16 10% 1/2W	R18 5% 1/2W	R26,R28
LM-C8	8±5%	4.6	3.9	3.2	2.1	-8.0	+21.2	-5.8	20.7	-2.7	900MF,35V 60V SURGE	0.018 MF,200V	3,000MF,35V 60V SURGE	054	L109	36486	36485	1K	1.2K 2W	820	2.4K	0.39 ±5%,5W
LM-C10	10±5%	4.2	3.6	3.0	2.0	-10.0	+21.7	-5.8	22.4	-3.3	900MF,35V 60V SURGE	0.018 MF,200V	3,000MF,35V 60V SURGE	054	L109	36486	36485	2.2K	1.2K 2W	820	2.4K	0.56 ±5%,5W
LM-C12	12±5%	4.0	3.5	2.9	1.9	-12.0	+23.2	-8.8	24.9	-4.0	900MF,35V 60V SURGE	0.018 MF,200V	3,000MF,35V 60V SURGE	054	L109	36486	36485	2.2K	1.8K	820	2.4K	0.68 ±5%,5W
LM-C15	15±5%	3.5	3.2	2.8	1.9	-15.0	+23.6	-8.8	27.3	-5.0	900MF,35V 60V SURGE	0.018 MF,200V	3,000MF,35V 60V SURGE	054	L109	35469	36220	2.2K	1.8K	820	2.4K	0.68 ±5%,5W
LM-C18	18±5%	3.2	3.0	2.7	1.9	-18.0	+24.5	-12.3	30.0	-2.7	900MF,35V 60V SURGE	0.018 MF,200V	3,000MF,35V 60V SURGE	054	L109	35469	36220	2.2K	2.5K	820	6.8K	0.68 ±5%,5W
LM-C20	20±5%	3.1	2.9	2.6	1.8	-20.0	+26.5	-12.3	32.9	-3.0	500MF,60V 100V SURGE	0.018 MF,200V	1,500MF,60V 100V SURGE	054	L109	36488	36487	2.2K	2.5K	820	6.8K	0.75 ±5%,5W
LM-C24	24±5%	2.5	2.4	2.2	1.5	-24.0	+32.1	-18.0	39.7	-3.6	500MF,60V 100V SURGE	0.018 MF,200V	1,500MF,60V 100V SURGE	054	L109	36488	36487	2.2K	3.6K	820	6.8K	1.0 ±3%,5W
LM-C28	28±5%	2.3	2.1	2.0	1.4	-28.0	+31.7	-22.5	42.2	-4.2	500MF,60V 100V SURGE	0.018 MF,200V	1,500MF,60V 100V SURGE	054	L109	36488	36487	2.2K	4.5K	820	6.8K	1.25 ±3%,3W
LM-C36	36±5%	2.0	1.8	1.7	1.3	-36.0	+34.6	-28.0	50.0	-3.9	500MF,60V 100V SURGE	0.018 MF,200V	1,500MF,60V 100V SURGE	054	L109	36488	36487	3.3K	5.6K	820	10.0K	1.25 ±3%,3W
LM-C48	48±5%	1.6	1.4	1.3	1.0	-48.0	-52.0	-40.0	70.7	-5.2	200MF,100V 150V SURGE	0.01 MF,200V	600MF,100V 150V SURGE	054	L108	35903	35902 or 36487	3.3K	3.0K	3.9K	10.0K	1.5 ±3%,3W
LM-C60	60±5%	1.1	1.0	0.90	0.80	-60.0	+40.0	-10.0	72.0	-4.5	200MF,100V 150V SURGE	0.018 MF,200V	600MF,100V 150V SURGE	054	L108	35903	35902	4.5K	10.0K 5W	820	15.0K 2%	1.5 ±3%,3W

SCB-C100-150A



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B"
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55CPS, FOR 360-440CPS, CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60 Hz; OUTPUT: NOM'L VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. IF Q5 OR Q8 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
13. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
14. ON UNITS WITH "V" OPTION, C1 IS 0.01MF±10%, 1000V, PAPER.

MODELS
LM-C100
LM-C120
LM-C150

REFERENCE DESIGNATIONS NOT USED	
Q6, Q7	R14, R15
Q4	R22
CR4,5	~~R25-R27~~
R19 R21	~~R29-R35~~
C9, C10	
C15-C29	

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-D.

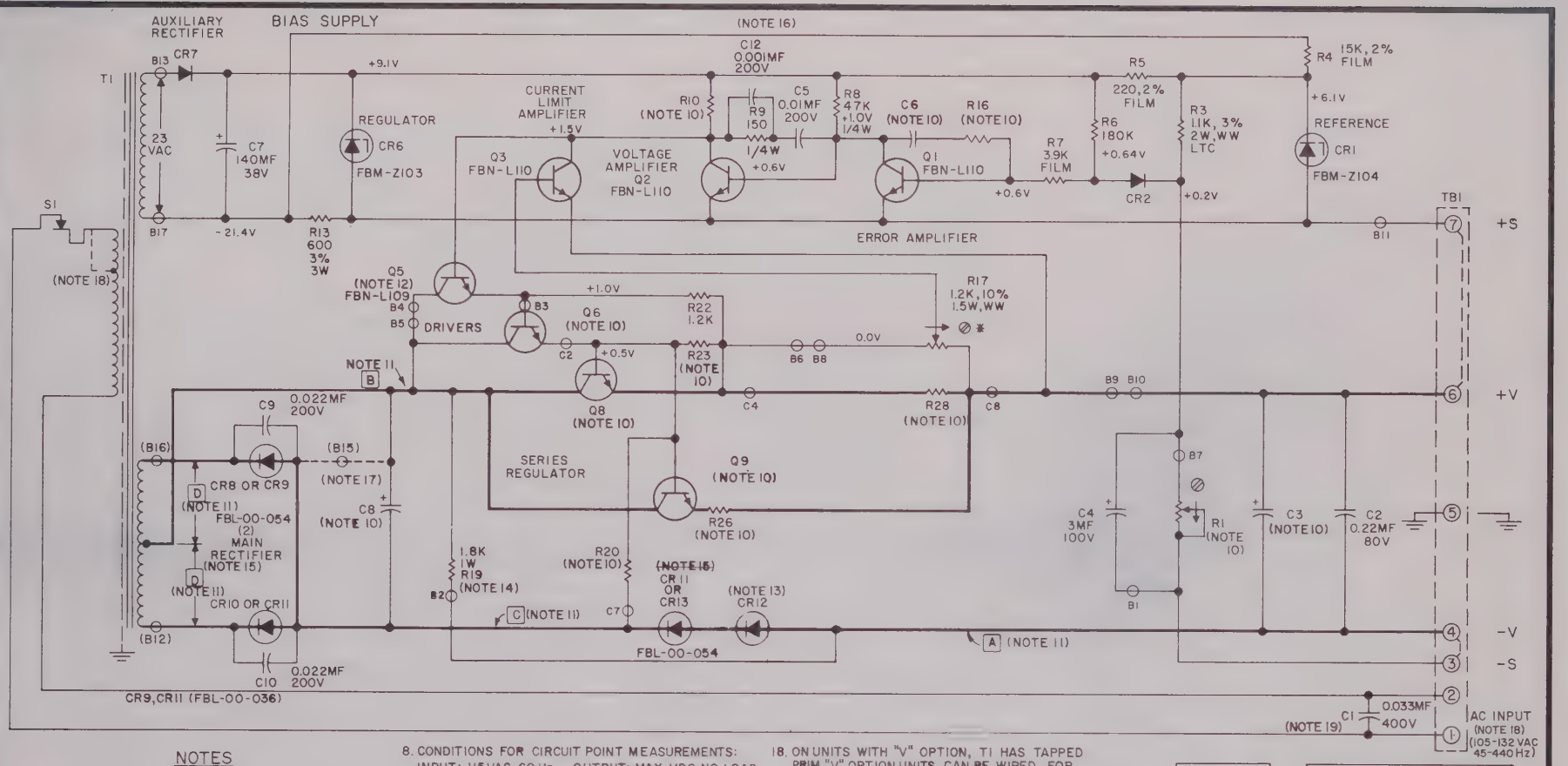
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.

TABLE I

DATA REFERENCES FOR MODELS LM-C100, LM-C120 AND LM-C150

Model	Voltage Range (VDC)	Max. Current (Amperes)				Schematic Voltage Measurement						Schematic Components				
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	E (VDC)	F (VDC)	CR8-11 (FBL00-)	R2 ±3%, 5W	R18 ±5%	R24 ±10%, 2W	R28 ±3%, 3W
LM-C100	100±5%	0.55	0.51	0.47	0.42	-100	+67.0	-20	120	-3.0	+32.7	033	16K	39K, 1/2W	27K	3.0
LM-C120	120±5%	0.49	0.45	0.42	0.38	-120	+73.0	-20	136	-4.0	+36.0	033	20K	43K, 1/2W	27K	3.0
LM-C150	150±5%	0.39	0.36	0.33	0.30	-150	+71.5	-20	160	-4.5	+34.8	064	26K	56K, 1W	27K	6.0



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B", BOARD "C".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 Hz, FOR 360-440 Hz, CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz, OUTPUT: MAX. VDC NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR & INSTALL WITH NEW TRANSISTOR.
13. CR12 USED ON LMC-0-32 ONLY.
14. R19 ONLY USED IN MODEL LM225.
15. ON MODEL LMC-0-32 MAIN RECTIFIER IS CR9,CR11 WITH CONNECTION REVERSED AND XFMR CTR TAP CONNECTED TO MINUS LEG, CATHODES OF CR9, CR11 CONNECTED TO PLUS LEG; CR11 BECOMES CR13.
16. CI2 NOT USED ON MODELS LMC-0-14, LMC-0-32.
17. -o- B16, B12, B15 APPLY FOR MODEL LMC-0-32 ONLY.
18. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
19. ON UNITS WITH "V" OPTION, C1 IS 0.01 MF ±10%, 1000V, PAPER.

REFERENCE DESIGNATIONS NOT USED	
C11	R2
Q4	R11,12
Q7	R14,15
CR4	R18
	R21
CR3	R24
CR5	R25,27

MODELS
LM-225
LMC-0-14
LMC-0-32

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TBI INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

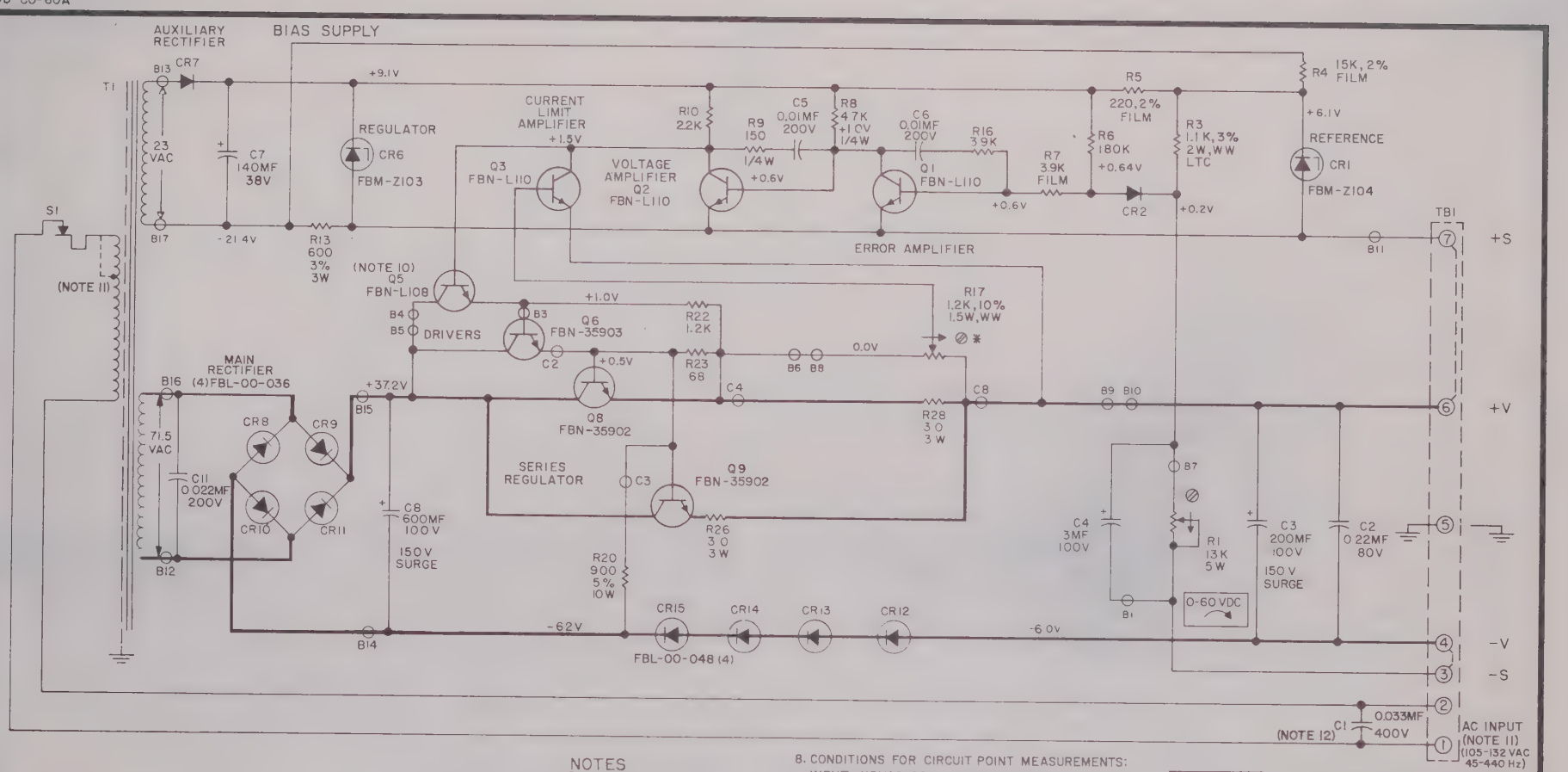
LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.

TABLE 1

DATA REFERENCES FOR MODELS LM-225, LMC-0-14 AND LMC-0-32

Model	Voltage Range (VDC)	Max. Current (Amps)				Schematic Voltage Measurement				Schematic Components										
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	C3	C6	C8	Q6 (FBN-)	Q8, Q9 (FBN-)	R1 5%, 5W	R10 10%, 1/2W	R16 10%, 1/2W	R20	R23	R26 R28
LM-225	0-7	4.0	3.6	3.0	2.4	-7.0	+15.5	-7.6	16.6	1000MF, 28V 35V SURGE	0.0068MF 200V	6000MF, 20V 35V SURGE	36486	36485	2200	3900	1800	300 3%, 3W	100	0.68 5%, 5W
LMC-0-14	0-14	2.2	2.0	1.8	1.5	-14.0	+12.7	-14.5	19.9	900MF, 35V 60V SURGE	0.018MF 200V	3000MF, 35V 60V SURGE	36486	36485	3300	2200	820	300 3%, 3W	68	0.75 5%, 5W
LMC-0-32	0-32	1.1	1.0	0.90	0.80	-32.0	+14.0	-33.0	33.6	500MF, 60V 100V SURGE	0.018MF 200V	1500MF, 60V 100V SURGE	36488	36487	9000	2200	820	470 2%, 10W	68	1.5 3%, 3W

SCB-CO-60A



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B", BOARD "C".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 CPS, FOR 360-440 CPS, CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60Hz , OUTPUT:60VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW RADIATOR
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED AC INPUT IS 205-265V
12. ON UNITS WITH "V" OPTION, C1 IS 0.01 MF±10%, 1000V, PAPER.

RATING TABLE	
AMB. TEMP.	MAX. LOAD
40°C	1.1A
50°C	1.0A
60°C	0.90A
71°C	0.80A

(SEE NOTE 7)

REFERENCE DESIGNATIONS NOT USED	
	R2
Q4	R11,12
Q7	R14,15
CR4	R18,19
	R21
CR3	R24
CR5	R25,27

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

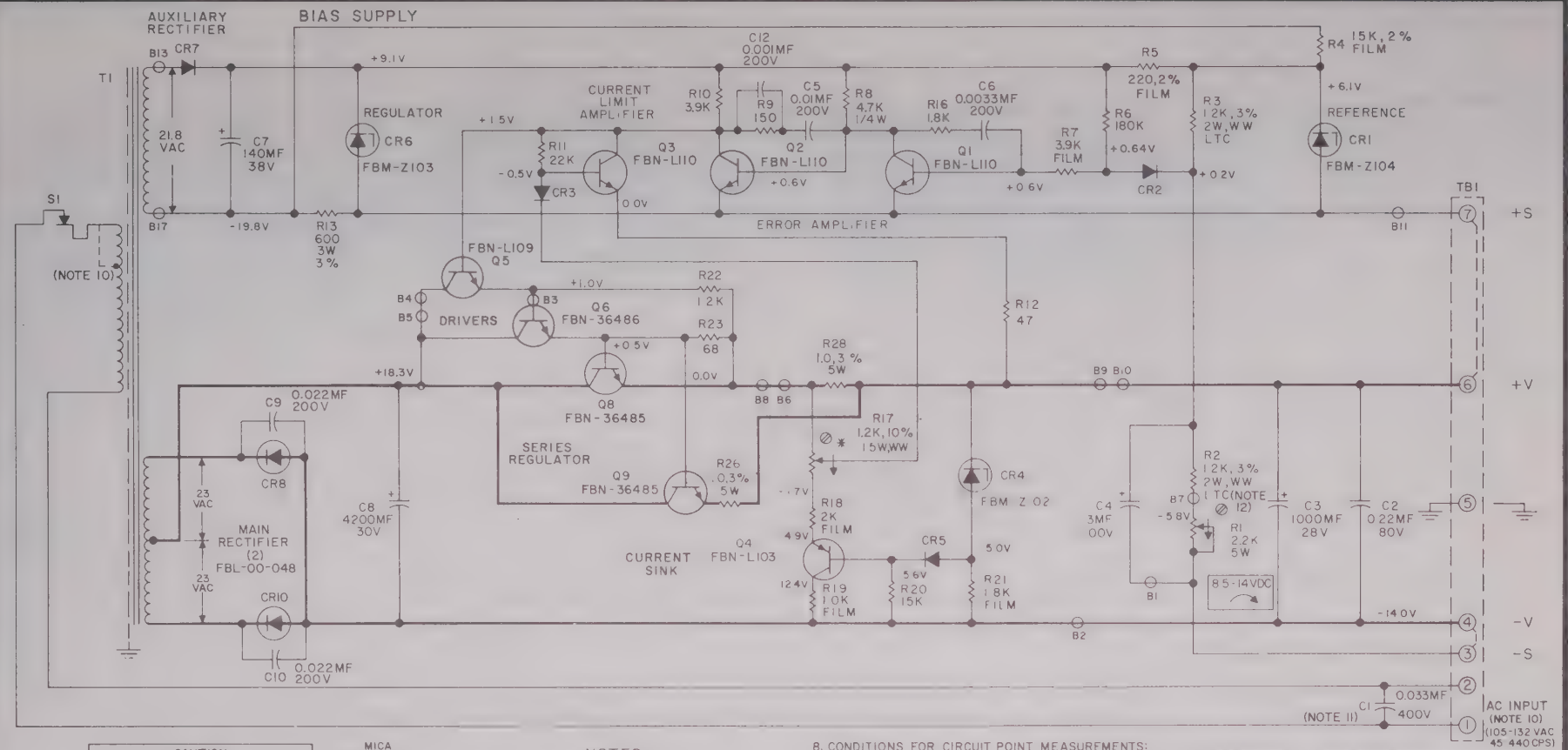
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

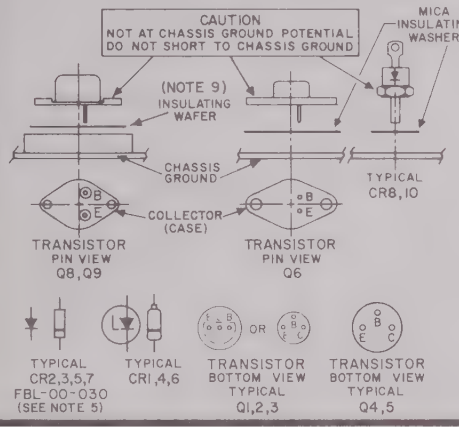
THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXESA-D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

MODEL LMC-0-60 0-60VDC

LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.





NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 CPS, FOR 360-440 CPS, CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60CPS; OUTPUT: 14 VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
11. ON UNITS WITH "V" OPTION, C1 IS 0.01 MF ±10%, 1000V, PAPER.
12. ON UNITS WITH "S" OPTION, R2 IS A JUMPER.

REFERENCE DESIGNATIONS NOT USED	
Q7	CR9
	R14
	R15
	R24
	R25
	R27

RATING TABLE	
AMB. TEMP.	MAX. LOAD
40°C	3.3A
50°C	3.0A
60°C	2.5A
71°C	2.0A

(SEE NOTE 7)

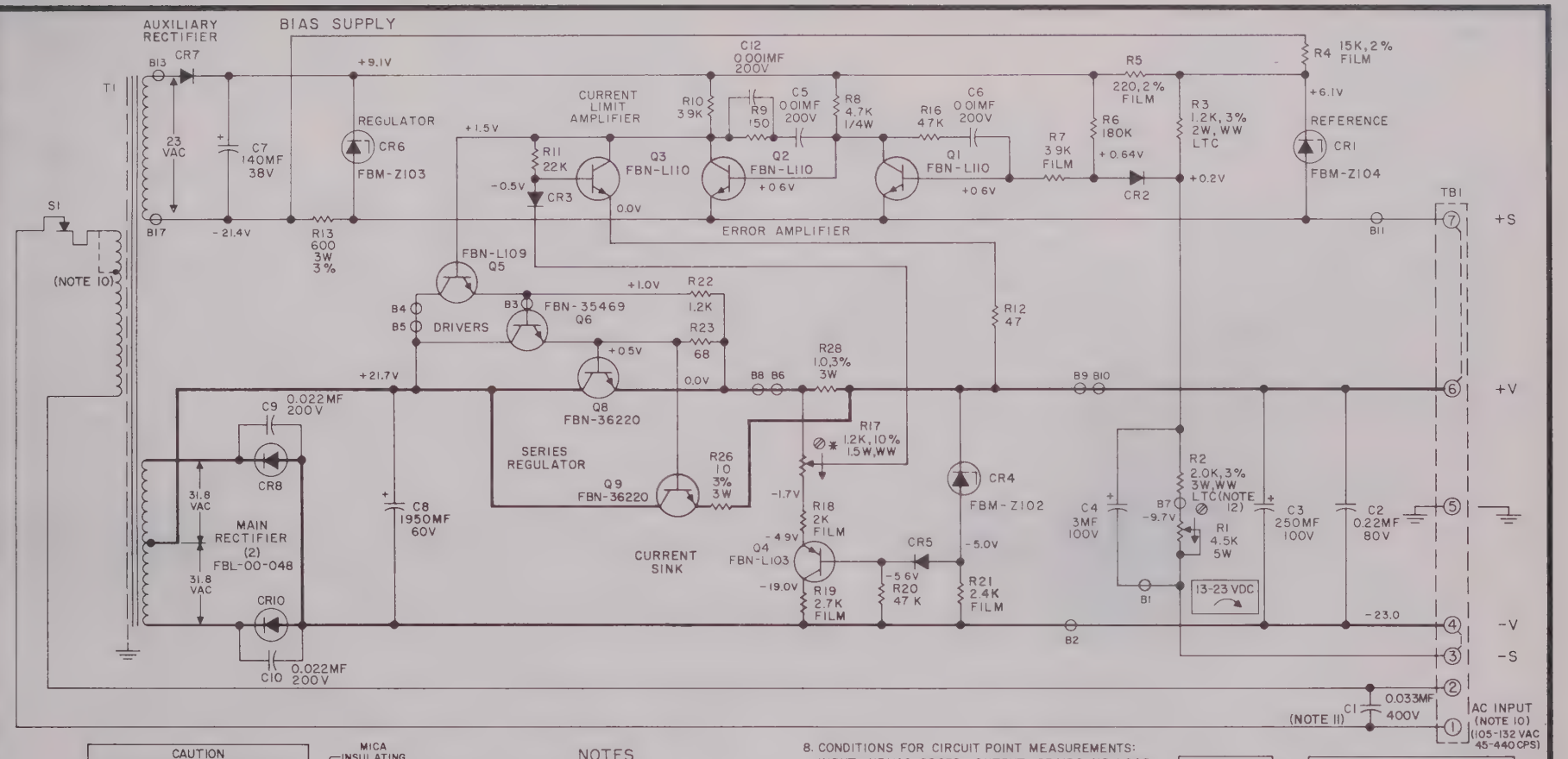
FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

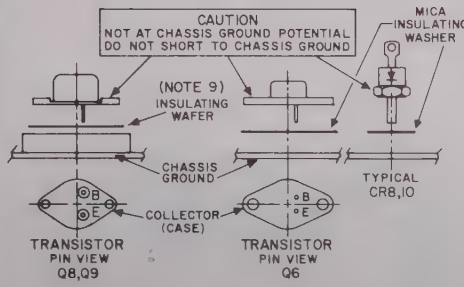
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
MODEL LM226, 8.5-14 VDC

LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.





NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%, +100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 CPS, FOR 360-440 CPS CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 CPS; OUTPUT: 23 VDC, NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED FOR 187-242 V INPUT (USING TAP), OR FOR 205-265 V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265 V.
11. ON UNITS WITH "V" OPTION, C1 IS 0.01 MF ±10%, 1000 V, PAPER.
12. ON UNITS WITH "S" OPTION, R2 IS A JUMPER.

REFERENCE DESIGNATIONS NOT USED	
Q7	R14
	R15
CR9	R24
	R25
	R27

RATING TABLE	
AMB. TEMP.	MAX. LOAD
40°C	2.3A
50°C	2.1A
60°C	1.7A
71°C	1.4A

(SEE NOTE 7)

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

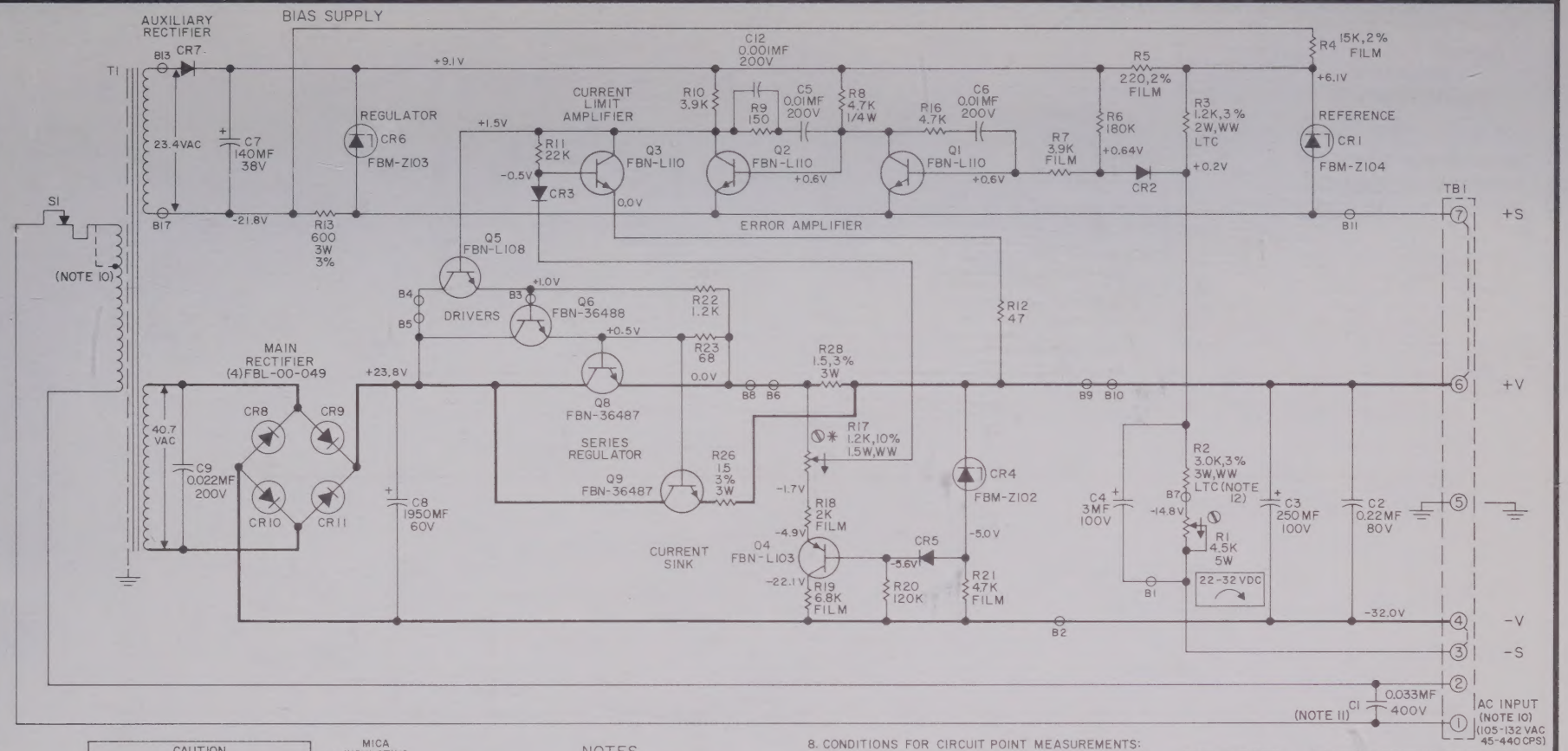
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

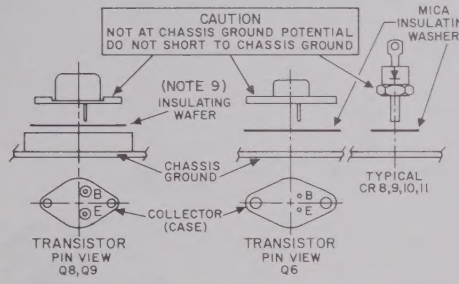
THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-D

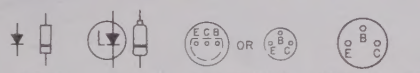
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

MODEL LM227, 13-23VDC

LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.







NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B"
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 CPS, FOR 360-440 CPS, CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 CPS; OUTPUT: 32 VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
11. ON UNITS WITH "V" OPTION, C1 IS 0.01MF±10%, 1000V, PAPER.
12. ON UNITS WITH "S" OPTION, R2 IS A JUMPER.

REFERENCE DESIGNATIONS NOT USED	
Q7	R14
	R15
	R24
	R25
	R27

RATING TABLE	
AMB. TEMP.	MAX. LOAD
40°C	2.0A
50°C	1.8A
60°C	1.5A
71°C	1.2A

(SEE NOTE 7)

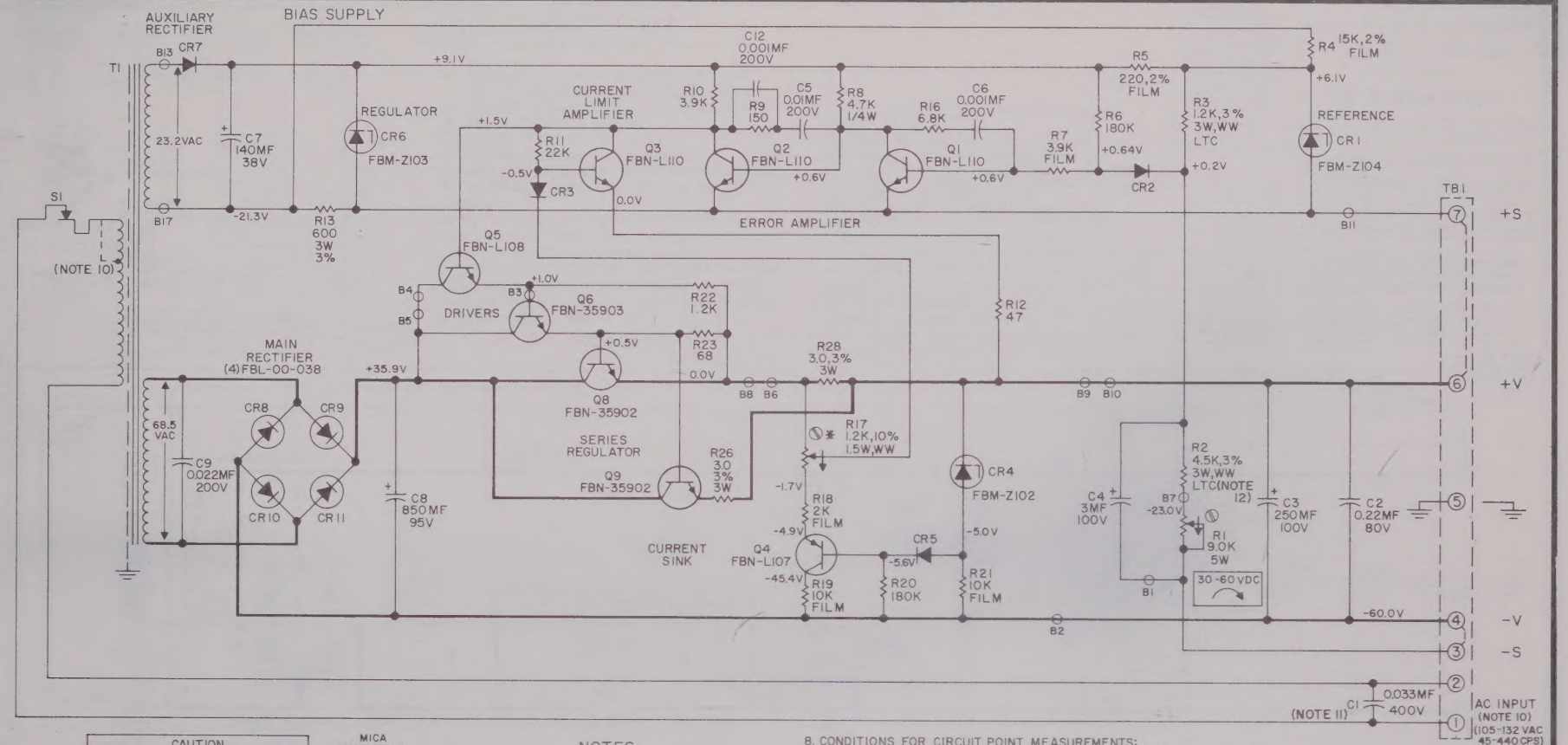
FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

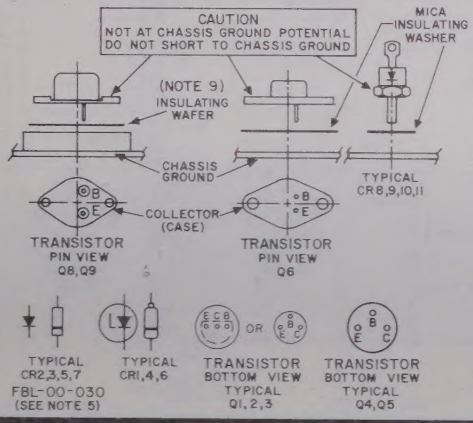
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
MODEL LM228, 22-32VDC

LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.





NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 CPS, FOR 360-440 CPS, CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 CPS; OUTPUT: 60 VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIM. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIXES A-C, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
11. ON UNITS WITH "V" OPTION, C1 IS 0.01 MF±10%, 1000V, PAPER.
12. ON UNITS WITH "S" OPTION, R2 IS A JUMPER.

REFERENCE DESIGNATIONS NOT USED	
Q7	R14
	R15
	R24
	R25
	R27

RATING TABLE	
AMB. TEMP.	MAX. LOAD
40°C	1.1A
50°C	1.0A
60°C	0.8A
71°C	0.6A

(SEE NOTE 7)

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
MODEL LM 229, 30-60 VDC

LAMBDA
ELECTRONICS
MELVILLE, NEW YORK
DIVISION OF Veeco INSTRUMENTS INC.

5-Year
Guarantee
We warrant each instrument manufactured by us, and sold by us or our authorized agents, to be free from defects in material and workmanship, and that it will perform within applicable specifications for a period of five years after original shipment. Our obligation under this guarantee is limited to repairing or replacing any instrument or part thereof, (except tubes and fuses) which shall, within five years after delivery to the original purchaser, be returned to us with transportation charges prepaid, prove after our examination to be thus defective.
We reserve the right to discontinue instruments without notice, and to make modifications in design at any time without incurring any obligation to make such modifications to instruments previously sold.

LAMBDA ELECTRONICS
515 BROAD HOLLOW ROAD • MELVILLE, L.I., NEW YORK • 516-694-4200

DIVISION of Veeco INSTRUMENTS INC.

www.manualsplus.com
1008302